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REVIEW OF FORECASTING IN THE
ECONOMIC RESEARCH SERVICE

by

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Economic Research Service
U.S. Department of Agriculture

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FOREWORD

Dramatic changes occurred in the food and fiber sector during 1972-73 which raised many questions about our system of economic intelligence in the Federal Government. As a result, increased attention was focused on the performance of the forecasting activity in the Economic Research Service (ERS). Consequently, in the spring of 1973, Quentin M. West, administrator of ERS, established an ERS task force to review ERS forecasting procedures and recommend needed improvements. The task force included the following ERS personnel: Jim L. Matthews, chairman; Allen B. Paul; Richard C. Haidacher; William E. Kost.

After a preliminary investigation and several task force meetings, it became evident that the original charge to the group implied a much more difficult and complex undertaking than had been initially perceived. Also, it was clear that considerably more time and effort would be needed if the final product were to contain the necessary analytical substance to provide a basis for recommendations for improving ERS forecasting activities.

At this point, the major share of the burden for conducting the continued study and supporting analyses shifted to Jim L. Matthews and Richard C. Haidacher. Dr. Matthews subsequently left ERS to join the U.S. Department of Treasury and Dr. Haidacher brought the study to this final report. Because of these factors and other circumstances, completion and publication of the study covered an extended period of time, during which several organizational and other changes occurred. In fact, early results and recommendations of this study were instrumental in several subsequent changes. Consequently, with respect to organization, personnel, and procedures, there are some differences between what currently exists in ERS and the detailed description of that which existed in 1973 and 1974. Since one of the primary purposes of the study was to document what existed during the 1973-74 period, the report was not revised to incorporate subsequent changes. Instead, an addendum is included which highlights the major changes.

In addition to the direction and advice of the ERS administrative staff, the support and contributions of a large number of individuals in various program areas of ERS were enlisted by the authors. It would be difficult to acknowledge all of these persons and their individual contributions. However, where feasible, every effort has been made to recognize specific contributions.


Kenneth R. Farrell
Deputy Administrator
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LIST OF ACRONYMS

AID - Agency for International Development

ASCS - Agricultural Stabilization and Conservation Service

CED - Commodity Economics Division

DSC - Data Services Center

EPAS - Economic Projections and Analytical Systems

ERS - Economic Research Service

FAS - Foreign Agricultural Service

FCDACI- Foreign Consumption Demand Analysis and Consumer Interests

FD CD - Foreign Demand and Competition Division

ICED - Interagency Commodity Estimates Committee

IFFFS - Inputs and Finance in the Food and Fiber Sector

NEAD - National Economic Analysis Division

PPPA - Pricing Policy and Program Analysis

SPM - Sector Performance Measures

SRS - Statistical Reporting Service

SUMMARY

An evaluation of the forecasting activity in the Economic Research Service (ERS) identified several areas which needed further attention: (1) specification of appropriate procedures for measuring forecast error, (2) determination of actual sources of forecast error, (3) determination of the implications of forecast error, and (4) use of futures quotations in forecasting cash market prices.

The particular methods used in developing ERS forecasts, although very detailed in many respects, are quite informal compared with more structured quantitative models. As a consequence, it is much more difficult to verify the procedures and forecasts in a scientific sense. Information compiled in this report suggests that such procedures can eventually be verified and, consequently, more fully evaluated in a scientific context.

Examination of the ERS consensus price forecasts for 1966-74 indicates that the pattern of forecast errors compared favorably with forecasts formulated by some alternative procedures and methods even in 1973, a year of considerable uncertainty. Tentatively, many of the forecast errors in 1972 and 1973 were traceable to a lack of knowledge about (1) economic relationships and data for foreign markets, (2) supply adjustment relationships for both livestock and crops in the United States, and (3) stock adjustment relationships. These difficulties were magnified in the absence of a broader framework of analysis for technically reviewing and handling information on commodity markets.

The ERS forecasting record showed a tendency toward underestimation of price levels and changes for the index of prices received for all livestock and crop commodities. For many of the minor individual crop and livestock products, a more random pattern of errors emerged, while the major commodities displayed strong tendencies toward underestimation. Unfortunately, a formal program for monitoring such forecast characteristics and evaluating alternative possible procedures has not been an essential part of the forecasting program. Also, a rigorous investigation of the value and implications of forecasts for the users has not been conducted.

Some historical perspective on the organization and operation of the forecasting and outlook program is presented to give the reader insight into alternative organizational and staffing considerations. While the reorganization of ERS has helped to correct many deficiencies in the forecasting activity that existed prior to July 1, 1973, problems which still exist are (1) an inadequate framework for global analysis, (2) lack of a framework for coordinating forecasting activity and analysis among the various units which assemble outlook intelligence, and (3) a deficiency of staff with the skills and training required to implement and utilize contemporary forecasting techniques and methods.

A REVIEW OF FORECASTING IN THE ECONOMIC RESEARCH SERVICE

by

Richard C. Haidacher and Jim L. Matthews 1/

INTRODUCTION

Background

The magnitude and frequency of forecast errors during 1973 stimulated more than the usual interest in forecasts and forecasting procedures of the Economic Research Service (ERS). It also resulted in at least two major inquiries into the adequacy of the economic and policy intelligence framework throughout the Federal Government. A report by the Government Accounting Office (GAO) makes the following concluding observation:

None of the agencies had procedures for systemically considering the possible impacts of events upon commodities monitored...Agriculture, Commerce, Interior, did not assess the likely consequences of future events on commodities...that failure has been critical and stems from the absence of carefully considered assumptions about characteristics of a commodity which link it to the consequences of the event. 2/

The GAO report goes on to state that there is a need for verifiable results, explicitness, and objectivity in forecasting analyses. In a report to the Council of Economic Advisors in early 1974, Karl Fox identified the lack of a global framework of analysis in agriculture as the single most limiting factor in the formulation of economic and outlook intelligence. 3/

ERS also asked additional questions and focused inquiries more directly on its own forecasts. For example, were errors in ERS forecasts due to insufficient or inadequate data, lack of adequate demand and supply relationships, inaccessability to timely information on policy decisions, or the lack of a well coordinated policy and analytical framework?

1/ Richard C. Haidacher is an agricultural economist with CED, ERS. Jim L. Matthews, formerly an agricultural economist in the Commodity Economics Division (CED) of ERS, is currently an agricultural economist with the U.S. Department of Treasury.

2/ "U.S. Actions Needed to Cope with Commodity Shortage," GAO Report to the Congress by the Comptroller General of the United States, Apr. 1974, p. 122.

3/ Fox, Karl A., An Appraisal of Deficiencies in Food Price Forecasting for 1973, and Recommendations for Improvement, Nov. 1973, unpublished.

Key Considerations in Appraising Forecasting

The key considerations in appraising forecasting can be classified as those which (1) deal with organizational structure within which the forecasting activity is performed, (2) pertain to staffing and personnel who perform the activity, and (3) deal with the general methodology and procedures employed.

Organizational Structure

Two organizational aspects need emphasis when considering a forecasting activity such as the one in ERS. The first is that a high degree of specialization and division of labor is required. This results from the multiple uses of the information, the inherent detail required, and the complexity and difficulty of the task. The second, which is a consequence of the first, is that a high degree of coordination is needed among the specialized activities. This coordination requires direct two-way communication, with explicit designation of responsibility and the authority to take action.

Personnel and Staffing

The two main personnel and staffing considerations are the size of staff and the appropriate combination of skills, training, and experience. Obviously, these factors relate to the organizational aspects of specialization and coordination.

Methodology and Procedures

This category covers the general approach to the forecasting activity, including its major components and the specific techniques, procedures, and data employed. From a general viewpoint, developing a forecast can be characterized as a synthesis of two components--observations and procedure. Certain observations and data that are known with some degree of certainty are combined with a specified procedure to generate a forecast about an event that is known with a lesser degree of certainty and which may be an integral part of some decision process. The class of procedures, even for a "scientific forecast," contains a multiplicity of possible alternatives that range between the most formal to informal and from the most quantitative to the most qualitative. Given that the input information used in conjunction with the procedure to generate a forecast is both qualitative and quantitative, a major distinguishing feature deals with the question of how and at what stage the different types of input information are utilized.

Major components of the forecasting activity include evaluation of alternative methods, techniques, and procedures and evaluation of the forecasts, per se. The latter evaluation comprises several aspects, including determining the source and amount of error and its effect on, or through, decisions.

Objectives

The major objective of the ERS outlook program is to provide timely economic analysis and related intelligence on agriculture and related sectors that can be used to make better decisions on economic matters related to those sectors. The information provided should be the best that can be obtained, given the contemporary skills and techniques, the state-of-the-arts, and the limited resources and other constraints within which ERS operates.

Given this objective, obviously, the information provided by the program must serve more than a single use, purpose, or clientele. Based on rather broad areas of use associated with a particular clientele, three categories can be identified--agricultural production, agribusiness, and policy. The first category includes use of outlook information by agricultural producers for both individual and group decisions on inputs, production, marketing, and planning. The second category includes individual and group decisions of a similar type for food processors, traders, and distributors. The last category includes information relevant to policy formulation, development, and operation that have implications for the consuming public.

National Agricultural Outlook Conference 4/

Since 1923, when the first National Agricultural Outlook Conference was called by Agriculture Secretary Henry C. Wallace, the purpose of the annual gatherings has been to get economic research findings out to the farmer and to the people who service his needs. As stated by H. C. Taylor, who fathered the annual outlook conferences: "Our proposal was not to formulate an agricultural program but to draw a picture of the conditions with respect to the probable supply and demand throughout the competing area...The farmers were not to be told what to do but given the facts they needed in order to act intelligently..." However, the character, if not the purpose, of these forums has changed over the years.

Unlike the meetings today, which are open to anyone interested in American agriculture, the first conference was held behind locked doors and attendance was by invitation only. Among those present at the meeting were representatives of National City Bank of New York; Armour and Co.; Harvard and Cornell Universities; Corn Belt Meat Producers Association; Chase Manhattan Bank; Institute of Economics of Massachusetts; Federal Reserve of New York; U.S. Department of Commerce; and the American Farm Bureau Federation.

4/ This section was prepared by Wayne D. Rasmussen and Gladys L. Baker, ERS historians, and is based on material from their book, The United States Department of Agriculture.

Attendance at the first outlook conference was restricted because the participants reviewed the first report ever issued on farmers' planting intentions for the coming season and decided whether these were in line with the prospective demand. This report, like other early outlook reports in subsequent years, was very specific and made recommendations to farmers which irritated some groups.

For example, the 1923 report, which forecast a 12-percent increase in cotton acreage, coincided with a plunge in cotton prices. Senator Tom Heflin of Alabama said it was the report "that broke the price; that inexcusable and indefensible estimate that was sent out reduced the price of cotton several dollars a bale, and it cost farmers of the South millions and millions of dollars."

Again in 1927, a forecast of lower cotton prices coincided with a plunge in the market, and again many people blamed the USDA report. However, Lloyd S. Tenny, chief of the Bureau of Agricultural Economics, defended the USDA position before Congress. Noting that cotton prices began to tumble a week before the 1927 situation statement was issued, he believed the prices fell because they had risen out of line with supply and demand conditions. He did not go along with the view that USDA should present facts and let farmers decide for themselves. "...Facts without interpretation," Tenny contended, "mean nothing....Large business organizations employ statisticians and economists to collect and analyze such information for them. Six million unorganized farmers cannot do this themselves."

Regardless of who was right, from then on the outlook forecasts were worded more cautiously. They became more general, with increasing emphasis placed on supply and demand trends and their likely impact on farm prices. Specific recommendations to raise or lower production were found less often in the summary statements.

To illustrate, the 1925 report said about corn that "an increased acreage...does not appear advisable." In 1931, the summary statement read: "With prospects for only a slightly greater demand for corn and with much larger supplies in prospect, it is probable that prices during the season beginning in November 1931 will average somewhat lower than during the present season."

The changing reports of the outlook conferences reflected the changing health of the economy, both in the United States and around the world. As the outlook in 1931 was grim, the conference participants heard the following: "The situation at present...is clouded by an unusual combination of circumstances, chief among these being the general business depression, the large supplies of wheat, cotton, and certain livestock products, the disturbed conditions in various producing areas resulting from the drought (worst in 29 years), unusually severe import restrictions imposed by foreign countries against agricultural products, and the maladjustment of price relationships accompanying the recent worldwide decline in all commodity prices." In November 1942, the outlook conference reported: "Total war dominates the farm outlook for 1943...American soldiers will be adequately fed and clothed. Essential supplies will be carried to our allies. Farmers will work harder

than ever before, and in return they likely will receive the greatest income in their history."

By 1940, outlook work had become a year-round service to agriculture, and representatives of the State experiment stations were playing a leading role in developing outlook materials and participating in the national outlook conferences. In an earlier move to adapt national outlook findings to the local situation, regional outlook conferences were begun in the early thirties. Although these were later discontinued, after World War II they were resumed and continue to be held.

Of course, the issues confronted by the outlook analysts today are quite different from those facing the analysts decades ago. Instead of lend-lease and the soil bank, there are such concerns as the set-aside program, eutrophication and agricultural pollution, growth of the European Community, and devaluation of the dollar.

Today, the National Agricultural Outlook Conference is a 4-day conference attended by State Extension Service outlook specialists, agribusiness representatives, news media, representatives of the embassies in Washington, and the general public. However, communication with farmers and the general public is largely indirect through the Extension Service and the news media. The conference includes sessions on general economic outlook, agricultural outlook, world agricultural situation, commodities, and family living.

In addition to the information that reaches the public, the outlook programs provide a substantial flow of economic intelligence on agriculture for use within the Government. This intelligence is designed to contribute to more informed decisionmaking in formulating and administering all aspects of agricultural policies and programs.

Publications Output 5/

In addition to the National Agricultural Outlook Conference, the most visible output of the outlook program is the series of periodic situation reports. As of 1974, there were 21 different situation reports, of which from 1 to 6 issues were published each year. In addition, the Agricultural Outlook Digest was published monthly. Such reports are available to the public on request.

Situation reports are a primary vehicle through which the forecasts prepared by the ERS staff are made available to the public. The reports present economic and statistical analyses of factors affecting the supply, consumption, and prices of the commodity covered by the report. The reports

^{5/} Information in this section is based on material prepared by C. Kyle Randall, formerly an agricultural economist, ERS, and chairman of the Outlook and Situation Board.

typically discuss the current situation and recent past as a basis for the outlook and present a discussion of the analysis supporting the forecasts. The forecasts are usually limited to a year or less. Occasionally, the situation reports contain special articles that present the results of research which apply formal methods of analysis to quantify some aspect of supply or demand for a commodity. These articles contribute to better public understanding of some of the methods used in making forecasts.

Many farmers receive the situation reports directly, but a good many more obtain interpretation of the information through the Cooperative Extension Service, the news media, and other sources. The agribusiness community uses the situation reports as a source of information which often supplement specific needs.

In addition to the situation reports, the annual Handbook of Agricultural Charts, published since the thirties, is available to the public. Although most of the charts show historical trends, many show estimates or projections. The charts are also available as color slides. In 1974, ERS also issued a slide series on the world food situation--past, present, and future--and an extensive report on the world food situation with prospects to 1985.

PROCEDURAL AND ORGANIZATIONAL CHARACTERISTICS OF ERS FORECASTING 6/

This section focuses on both methods and organizational characteristics of the forecasting framework in ERS. The primary concern is in tracing past and current sources of errors in forecasts and in laying out a more systematic approach for comparing the merits of alternative forecasting techniques. An additional concern relates to the requirements for integrating judgment, opinions, and other qualitative information on market and policy developments with more formal analytical procedures. Also, the need to develop outlook intelligence at all levels of decisionmaking will be discussed.

General Characteristics

ERS forecasting efforts draw from a large array of supporting methods and techniques and result in many different types of forecasts. These forecasts can be characterized or classified in a number of ways which may help in gaining an initial overview of the forecasting activity before examining more specific aspects such as methods, organization, and staffing.

6/ Discussions on organization are largely based on a partial survey of analysts within the forecasting program. The information in this section pertains to the situation existing during 1973 and early 1974, and does not include subsequent changes. More specific comments on program activities by the individual analysts are given in app. A.

Some of the salient characteristics of ERS forecasts are as follows:

- (1) Forecasts are made for both official publication and for internal working use.
- (2) Forecasts are made on both a regular and an irregular basis. They range from regular monthly, quarterly, or annual forecasts to forecasts made every 2 to 3 years to one-time forecasts.
- (3) Forecasts cover varying time spans, ranging from short run (monthly) to long run (decades). The latter are usually referred to as "projections".
- (4) Forecasts vary from specific levels and magnitudes of changes to qualitative generalities.
- (5) Forecasts are based on methodology ranging from purely subjective judgment models to forecasts generated by formal econometric models.
- (6) Forecasts vary by the degree of specificity with respect to time, marketing level, region, or form of output.

Items for which forecasts up to a year ahead are typically prepared on a regular basis include price, production, consumption, and exports for all the major farm commodities such as beef, corn, and wheat, as well as for a number of less important commodities. In addition, forecasts are prepared on a regular basis for more aggregate performance measures of the farm economy such as (1) farm income, (2) production expenses, (3) volume of farm marketings, (4) farm and retail food price indexes, (5) productivity, and (6) total volume of U.S. exports and imports. On a less regular basis, shortrun forecasts are prepared, mostly on request, for such items as (1) farm financial or credit needs, (2) prices paid for nonfarm inputs, (3) Government payments, (4) farm program participation, (5) set-aside acreage, and (6) farm employment.

Longer run forecasts are prepared for such measures as the number, size, and distribution of farms, and the productive capacity of U.S. agriculture to accommodate changes in world food needs. Most of the longer run forecasts or "projections" are cast in a conditional framework so that alternative futures can be examined. Such a framework points up the possible implications of technological, environmental, nutritional, political, and institutional considerations as they affect the overall performance of the farm economy.

The methods used in ERS to generate forecasts for the several measures mentioned previously rely on a broad array of techniques and concepts. The choice of a particular procedure depends on (1) the data base, (2) the specificity of the intelligence needed, (3) the particular skills and training of the analyst, (4) the time frame associated with a particular request, and (5) the feasibility of quantifying factors which have a bearing on the forecast. Some of the more common methods used for shortrun forecasting

include trend analysis, graphic analysis, and examination of relationships that have held in the past. To a much lesser degree, analysts employ econometric models, simulation models, linear programming models, input-output models, and a variety of statistical techniques.

The shortrun methodological framework in ERS might be described as a process for integrating and utilizing a broad array of techniques which combine qualitative judgments and formal analytical techniques in order to develop forecasts of varying specificity--from very microforecast measures to agricultural sector performance measures. The analyses are largely performed within the traditional supply-demand framework, which provides the analyst with an internal accounting check on forecasts of supplies and utilization. Such a framework is an important consideration in the formulation of price forecasts since price adjustments are required to bring about a market-clearing equilibrium. This concept of the market permits a number of variations in the formulation of price-forecasting relationships.

Some of the primary shortrun forecasting responsibilities of ERS have been for domestic utilization and prices of crop and livestock products, and macroperformance measures of the agricultural economy. Export and trade forecasts for up to a year ahead have been the joint responsibility of the Foreign Agricultural Service (FAS) and ERS. Crop supply forecasts for up to a year ahead have been largely the responsibility of three agencies: the Statistical Reporting Service (SRS), ERS, and the Agricultural Stabilization and Conservation Service (ASCS). Livestock supply estimates are a joint responsibility of SRS and ERS. However, in the final analysis, ERS has the major responsibility for integrating and organizing forecasts into a coherent whole and for making this intelligence available to a large variety of public and private interests. Such forecast intelligence in ERS results from integrating the analytical efforts of various specialists located within the three divisions of ERS that comprise the Food and Fiber Economics Sector (FFE). ^{7/} Because there is no easily recognizable or equivalent entity in the formal organizational structure to identify these groups of specialists, they will be referred to as "units" contained within a part of the formal structure and will be distinguished according to whether their subject matter focus is on (1) commodities, (2) farm inputs, (3) the aggregate farm or food sectors, or (4) foreign agricultural trade.

In addition to these units in ERS, the Interagency Commodity Estimates Committees are important organizational elements in the integration of economic intelligence for forecasting, particularly at the commodity level. Representatives from ERS and other agencies with forecasting activities, primarily ASCS and FAS, serve on these committees. Factors influencing forecasts for supplies, trade, domestic consumption, and farm commodity prices are analyzed and discussed in these committees. ^{8/} The forecasts finally

^{7/}See app. B for organizational chart of ERS.

^{8/}See app. B for listing of committees.

prepared by ERS staff for publication are technically cleared by the Outlook and Situation Board which is chaired by the Outlook and Situation Officer, Office of the Administrator, ERS. 9/

In the following sections, more specific functional and organizational responsibilities of units charged with forecasting responsibilities are discussed. Methods employed by these units are examined in some depth, hopefully to establish some initial basis for determining where methods might be improved in the future. Since methods and organization cannot be considered independent in discussing efficiency aspects of the procedural framework for forecasting, comments are made that indicate how these may relate to each other and affect the overall ability of ERS to conduct a well-coordinated program for outlook and policy analyses.

In the Commodity Economics Division

The major thrust of the forecasting activity in the Commodity Economics Division (CED) focuses on individual commodities for a time span of 2 years or less. Longer run forecasting, farm policy analyses, and performance measurements of the commodity sector are additional responsibilities of the commodity units.

The major inputs into individual commodity forecasting are numerical data, quantitative methods of data analysis, and a host of qualitative considerations, including a thorough knowledge of agricultural markets and production processes and judgments on missing data and relationships. These inputs are common to all forecasts, irrespective of the time horizon being considered. But the particular methods, concepts, data, and skills employed vary substantially according to the time horizon as well as other dimensions of the forecast. The basic skills of the analyst to combine all such inputs into a coherent forecast is of critical importance. Perhaps by discussing each of these inputs, some of the important aspects of the forecasting framework for individual commodities in CED will emerge.

Data Inputs

When questioned, analysts who prepare the shortrun commodity forecasts most frequently cited lack of sufficient data as a limiting factor in preparing forecasts. For the analyst charged with monitoring current intelligence and preparing forecasts for up to a year or less, more data would help in (1) providing a firmer basis for the assumed degree of constancy in observations and processes and (2) covering the broad array of specific demands by farmers, farm organizations, agribusiness firms, and other economic intelligence users.

^{9/}See app. B for statement of responsibilities of the Outlook and Situation Board.

Providing for a manageable data framework to accommodate specific clientele needs has been a significant function of the shortrun outlook analysts. Maintenance, development, and servicing of data accounts for summarizing supply sources and farm commodity usage have facilitated the timeliness of information flows and provided a ready basis for further analysis. These accounts are formulated on a quarterly and annual basis.

The implicit assumption of a large degree of constancy, particularly in farm output adjustments in the short run, has been a contributing factor to the development, refinement, and use of economic indicator data. Much of this data is often a byproduct of the activities of regulatory agencies which are charged with monitoring such things as grades and standards, and disease control. In addition, SRS collects substantial information on acreage, production, and stocks of crops; production and inventories of livestock and production of livestock products; as well as producers' intentions for major crops and some livestock items. When properly interpreted, this information provides a major basis for determining supply prospects in the year ahead.

Development and refinement of such data series have been a key responsibility of the commodity outlook analyst over the years. However, conducting the above activities has left the analyst little time to keep abreast of development and use of contemporary forecasting tools.

Methods Inputs

Some of the basic questions on forecasting methods are: (1) What methods and procedures are currently used by commodity analysts? (2) What factors influence the choice of particular methods? (3) Are the methods and procedures verifiable? However, only a sketchy response can be given to these questions because of the lack of previous documentation of methods.

In response to a partial survey on methods used for shortrun forecasting in 1973, analysts in ERS indicated that trend extrapolation of data series combined with survey information, if available, and qualitative judgments were the primary tools of analysis.^{10/} Use of more quantitative tools of analysis frequently included seasonal adjustments and selected single-equation regression relationships. Analysts usually considered estimated elasticities and flexibilities of demand and supply only as a final check on their forecasts of commodity prices and utilization. Formal statistical and econometric models were also considered at times as a check against their forecasts, but not as a common practice in preparing short-term forecasts for up to a year ahead. More consideration was given to formal model results, regression relationships, and other more quantitative inputs whenever forecasts extended beyond 1 year. However, forecasts made for up to 3 years ahead still relied heavily on qualitative procedures and methods. In all cases, internal checks on supply and use balances were facilitated through the supply and utilization accounting framework.

^{10/} See app. A for illustrative response by analysts to a forecasting questionnaire.

The essential characteristics of the shortrun forecasting procedural framework appear to be the following:

- (1) An accounting framework to verify supply and demand balances at quarterly and annual intervals.
- (2) Use of intentions data and survey data to forecast farm commodity supplies.
- (3) Use of export estimates and reports provided by FAS, supplemented with a qualitative review by ERS analysts.
- (4) Use of relatively naive statistical methods for forecasting prices and domestic usage, adjusted by considerable qualitative judgment.
- (5) Regular forecasts prepared quarterly for four quarters ahead and the next year ahead with frequent informal updating between forecast periods.
- (6) Use of both qualitative and quantitative inputs.
- (7) The analyst's knowledge about marketing and production practices and current developments in the marketplace which may affect some component of the supply-use accounts and subsequently prices, which provides a qualitative basis for adjusting trends. In addition, considerable time is spent in close contact with Government and private analysts and participation in frequent conferences and discussion sessions with farm groups, agribusiness interests, and other Government agencies.
- (8) Publication of forecasts and analyses in regularly scheduled situation and outlook reports. Such scheduling closely conforms with key releases of basic data from SRS.
- (9) Use of Interagency Commodity Estimates Committees to facilitate combining information on supplies, exports, domestic usage, and prices.
- (10) Technical clearance by the Outlook and Situation Board, which is chaired by ERS and has participating members from other agencies.

Adoption of a methodological and procedural framework, which depends largely on qualitative inputs and rather naive quantitative methods of analysis, is not what some might expect in terms of the current state-of-the-art. Some logical questions might be: (1) What factors contribute to this particular mix of inputs in the shortrun forecasting activity? (2) Is this the best mix regarding emphasis on methods and techniques? Answers for the second question require considerable investigation and analysis of alternative approaches in order to reach a definitive answer, yet this has not been directly emphasized as an important consideration in performing the outlook function except in times of crises. Further consideration of this question is given in the section on forecast evaluation.

Factors which have influenced the choice of forecasting methods for commodities have been (1) the lack of a clear-cut view of who the clientele are, (2) a lack of sufficiently precise knowledge on what the clientele's information needs are, (3) the information content of the forecast and how it may or may not affect the decisions of the clientele, (4) the skills and training of the analyst, and (5) the size and complexity of the task of providing information. Insufficient knowledge about the first three items has probably contributed substantially to a large proliferation in the demands on the forecasting services provided by ERS analysts. Because the needs and priorities of the clientele are not always clear, outlook analysts often attempt to respond to any and all requests, restrained only by time and eventually by budget. A further consequence is that the analysts generally sacrifice those methods and techniques which cannot be used to fit the pressures of the work schedule. The result is that the analysts resort to rather naive statistical techniques such as trend extrapolation, rely on survey and other indicator data, and use qualitative and other judgment inputs which can be integrated with the supply-utilization accounting framework.

Conclusions drawn from the above comments for shortrun forecasting methodology are that (1) additional research is needed to better measure the information content of ERS commodity forecasts for Government policymakers, farmers, agribusiness firms, and other users; (2) analyses are needed to compare existing naive statistical schemes used in forecasting with alternative approaches to determine the merits of each; and (3) additional documentation of procedures is needed to more precisely determine the sources of forecast error. Continued over time, such investigations would probably provide CED analysts and administrators a better basis for choice on the tradeoffs in program emphasis among alternative methods or other program inputs.

A review of forecasting procedures and methods used by commodity analysts when the forecast period is extended beyond 1 year suggests a number of important distinctions in methods, procedures, and organization, though many features of the shortrun framework may be retained. The most apparent shift in emphasis is toward using more formal analytical methods, though more qualitative methods still dominate. This shift is influenced largely by two considerations: (1) adjustments in the demand and supply structure are not tied as closely to technical and physical characteristics of the commodities in the longer run, and (2) random shocks due to temporary bottlenecks in the flow of goods and services are much less of a problem than in the short run.

The immediate implication of the above considerations is that ERS assumes a much greater responsibility for both domestic supply and export estimates when forecasts are extended beyond 1 year. Supply forecasts, which are generated to a large extent by SRS survey information in the short run, are not available for the extended outlook period. Furthermore, dropping the assumption of fixity in commodity supplies for the more realistic assumption that supply adjustments in commodities are highly interrelated leads to a substantially different empirical framework for making supply estimates. Methods which have been used include linear programming models, time series regression models, budgeting analyses, simulation, and a host of more naive statistical methods including trend extrapolation. While each of these

techniques has certain merits, none is used as the single indicator of longer term supply adjustments. Some of the responsibility for major crop supply projections is currently vested in the Commodity Program and Policy Analysis program area in CED. The methods used by this group in projecting crop supplies is embodied in a systematic approach known as the ACRE model (app. A). These projections are integrated with those by analysts in the individual commodity units to arrive at the ERS crop supply forecasts for the longer run.

Supply forecasts for other crop commodities and livestock production for 1 year or more are largely developed within individual commodity units. Procedures used for the most part rely on rather naive statistical methods, such as trend analysis supplemented by individual judgment. At times, more formal econometric models and systems of equations are used in conjunction with other methods. Some of these models are briefly described in a later section on model inventory.

Inability to adequately measure the factors influencing longer term supply adjustments has been a continuing problem regardless of the method of analysis employed. This has been particularly true for determining national supply response as opposed to firm supply adjustments. Inadequate knowledge about the relationship of input costs and farm programs to production adjustment are the most apparent difficulties. In addition, the formulation of producer expectations and the behavior of inventory and investment activities and how these influence longer term supply adjustments are not well understood and require intensive study. With more variation expected in input and product market prices in the future, there is a clear need for continuing research on factors influencing adjustments in product supplies and input markets. This activity should be correlated closely with future efforts to evaluate these systems for their forecasting merits.

Developing trade and export forecasts for a year or longer is primarily a responsibility of the Foreign Demand and Competition Division (FDCD), which is discussed in a later section. In FDCD, formal techniques and methods used vary from complex trade models to more naive statistical models, but all are supplemented with substantial judgment. Output or forecasts from FDCD are coordinated with commodity forecasts for the U.S. market prepared in CED and with the more aggregate forecast measures prepared in NEAD.

In estimating long-term domestic utilization and farm and retail prices, analysts in CED must consider the interdependency between demand and supply. This interdependency requires substantially greater coordination among individual crop and livestock forecasts to maintain internal consistency with respect to relative prices, inputs, and general economic assumptions. However, much of the responsibility for coordinating the individual forecasts and facilitating a common assumptive base for certain data inputs lies with NEAD. At times, more formal techniques that include systems of equations for estimating price, utilization, and supplies for major livestock and crop commodities are used to coordinate the individual forecasts within CED. Use of such techniques frequently contributes to a sharper understanding of the integrated set of commodity forecasts and facilitates the development and application of new demand, price, and supply relationships which can be linked together. This framework often facilitates the ease with which

interdependence among commodity sectors can be measured, particularly if assumptions unique to one sector, such as grains, are altered. Examples of models and systems of equations with potential current applicability in this area are summarized in the section on ERS models. However, since existing systems have not been fully subjected to rigorous evaluation in forecasting, additional empirical and theoretical research would seem justified in this area.

Steps which might be taken to strengthen the shortrun forecasting activity in CED include the following:

- (1) Develop additional empirical relationships and formal analytical frameworks for preparing quarterly forecasts. Extend current efforts to combine leading indicator data with other economic variables in a quarterly forecasting framework.
- (2) Develop more systematic procedures for isolating sources of input errors, whether from data, relationships, or both. For example, analyses of data provided by SRS, FAS, and other agencies could be examined in terms of their effect on ERS forecasts.
- (3) Conduct comparative evaluation analyses of alternative forecasting methods. For example, systems of equations with leading indicator data could be tested against trend extrapolation techniques.
- (4) Prepare more comprehensive documentation of current procedures and determine where use of ADP systems may be of help. Some of this activity could be coordinated with the Wharton School quarterly model which contains software routines for data banks and statistical analyses of data stored in such banks.
- (5) Conduct basic theoretical and applied research to determine the information content of ERS forecasts to users as well as the implications of forecast errors on firms, industry, public policymakers, and consumers.

In addition to the above steps, action which might be taken to strengthen the longer term forecasting activity include:

- (1) Further refinement and development of formal comprehensive frameworks for determining cross-commodity interrelationships on both demand and supply. Such frameworks could be of two types which could complement each other. The first type of framework would be a more formalized version of current techniques whereby forecast information is compiled sequentially by various analysts and assembled into final packages. Reasonableness of results would be determined sequentially at various stages of information. Assembly and assumptions on parameters would be adjusted to meet reasonability tests at each stage. These steps would limit the possibilities of adjusting final results without substantial additional effort.

The second type of comprehensive framework would be basically a system of equations wherein assumptions would be made initially and placed in a fixed parameter system which would generate internally consistent results. Final results would be checked for reasonableness, and assumptions would be then adjusted if necessary to obtain alternative outcomes. The principal advantages of this system would be its greater flexibility in considering quick changes in assumptions in the final stages and maintenance of internally consistent logic. The principal disadvantages would be the fixed-parameter assumptions, the greater complexity in development of such a framework, and at times, the greater difficulty in offering a detailed rationale for final outcomes.

- (2) Additional research to develop supply, demand, price, and stock relationships. Greater variability in input markets and lesser dependence on Government programs are not adequately accounted for in current supply models. Even less is known about factors influencing commercial stock demand. Because prices are so closely linked to demand and supply pressures and stock adjustments, new investigations are currently required.

In the next section, forecasting procedures and organizational responsibilities of the National Economic Analysis Division (NEAD) are considered. The relationship of methods and organizational activities in NEAD are related to those in CED and to those in FDCD to help illustrate some of the current organizational interdependence.

In the National Economic Analysis Division

Shortrun forecasting for up to a year ahead and intermediate-run forecasting for up to 3 years ahead are a major responsibility within five program areas in NEAD. Most of the forecasts are for the more aggregate performance measures of the food and fiber economy. Macro, as well as more microforecasts, are prepared for nonfarm inputs such as credit, fertilizer, fuel, farm machinery, and farm labor. These forecasts are prepared by the Inputs and Finance program area in the Food and Fiber Sector (IFFFS). The greater share of the shortrun forecasting activity, however, is housed in the Food Consumption, Demand Analysis, and Consumer Interests (FCDACI) program area, and the Sector Performance Measures (SPM) program area. Additional methodological support for the forecasting activity is found in the Pricing, Policy, and Program Analysis (PPPA) program area, while some activities in the Economic Projections and Analytical Systems (EPAS) program area provide assistance in forecasting productivity measures and more aggregate measures for prices paid for farm inputs.

Forecasts are prepared quarterly for up to four quarters ahead for such measures as farm and retail prices of all commodities, farm-to-retail price spreads, farm output, food consumption, farm marketings, farm production expenses, cash receipts, and net farm income. In addition, forecasts are made quarterly for a number of general economy measures, such as consumer disposable incomes and unemployment. On a less regular basis, forecasts are

prepared for these same items for up to 3 years ahead, with alternative possible outcomes specified. Quarterly forecasts are published regularly in Demand and Price Situation, National Food Situation, Farm Income Situation, and Agricultural Finance Outlook.

Although more specific statements about the forecasting activities in selected program areas are summarized in appendix A, an overview of the organizational and technical responsibilities of each program area is presented in the remainder of this section. Figure 1 illustrates some of the key interrelationships among forecasts prepared in ERS.

Demand and Price Unit of FCDACI

Shortrun forecasts and outlook intelligence for the nonfarm economy are prepared quarterly by this unit and disseminated to other areas in ERS for preparing outlook forecasts for farm commodity markets and farm input markets. The key forecasts prepared in this unit include the gross national product (GNP), consumer disposable income, the GNP deflator, and unemployment in the U.S. economy. Another major activity involves assembling individual farm commodity forecasts for prices, utilization, and supplies. While forecasts of aggregate farm price indexes are prepared in this unit from individual component forecasts, forecasts of other aggregate measures are made in other units on the basis of similar information. Aggregate measures are developed by the Food Consumption Unit of FCDACI, while farm output forecasts are prepared by the Farm Inputs Unit of IFFFS.

Forecasts for these variables are prepared quarterly for up to four quarters ahead. Unpublished forecasts for a month ahead are prepared for the index of prices received by farmers. On a less regular basis, unpublished annual forecasts are prepared for up to 3 years ahead. Published forecasts appear in the Demand and Price Situation quarterly.

An important activity performed at times by personnel in the Demand and Price Unit is an overall technical review and evaluation of forecasts prepared for farm commodities and food products by other analysts in CED, NEAD, and FDCE. Such an overview helps assure that various component forecasts are internally consistent with each other. However, it assumes that the staff knows both technical relationships among commodities and commodity sectors and those between the farm and nonfarm sectors of the economy.

In order to appraise agriculture within the context of the general economy, the overall economy is monitored regularly. From time to time forecasts are prepared which attempt to highlight employment, wages, and the flow of income to consumers, as well as price pressures and output of major inputs to farm production. Models used are usually based on relatively simple analytical frameworks and a considerable input of judgment. The analysts also have access to more formal econometric models from both inside and outside Government.

SOME KEY FEATURES OF THE ASSEMBLY AND FLOW OF FORECAST INTELLIGENCE WITHIN THE ECONOMIC RESEARCH SERVICE

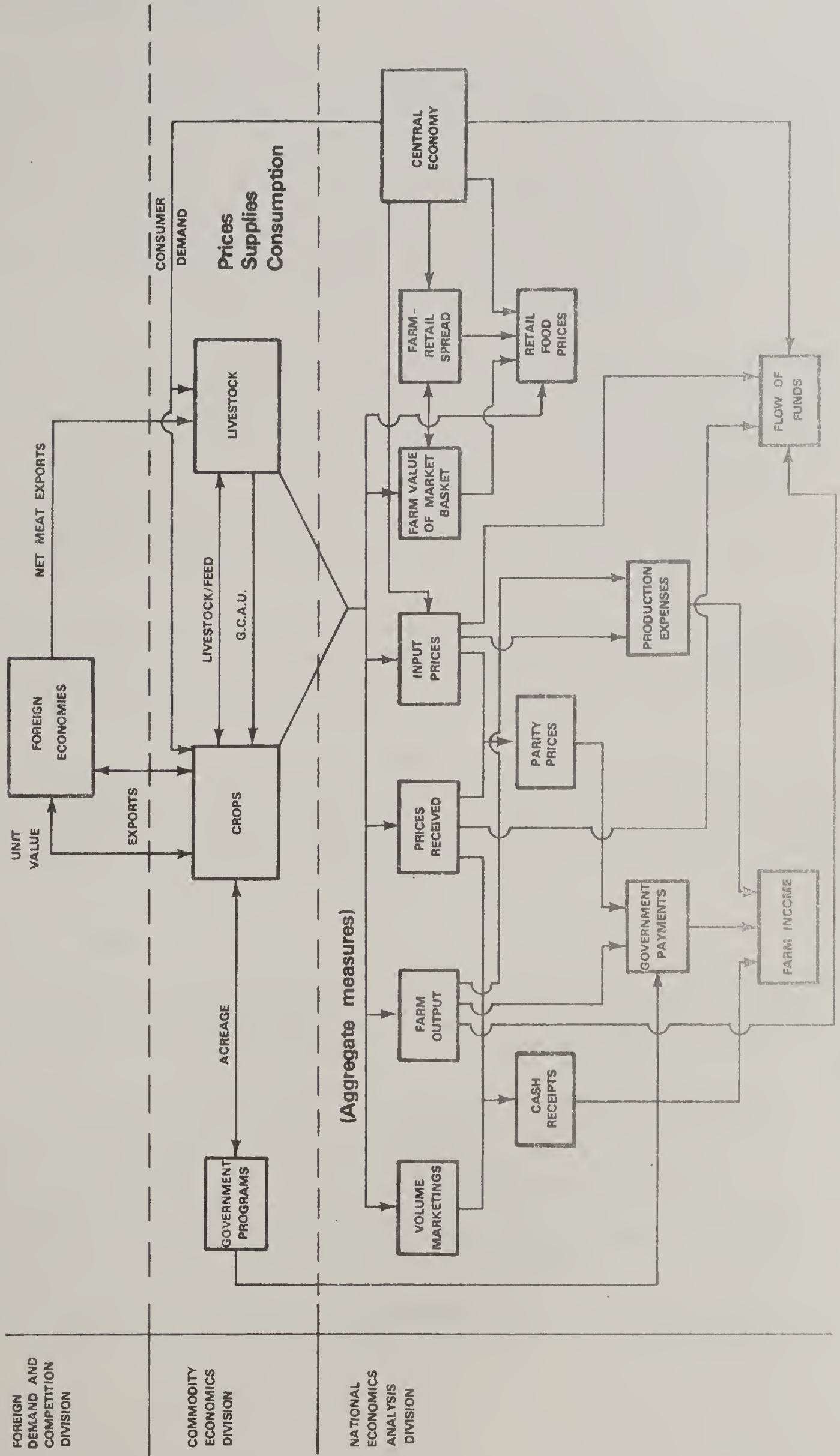


FIGURE 1

Food Consumption Unit of FCDACI

The Food Consumption Unit shares a major responsibility with the Market Statistics Unit located in the Sector Performance Measures (SPM) program area for forecasting retail food prices. In addition, aggregate forecast measures for food consumption and utilization are prepared by this unit each quarter for up to four quarters ahead. Retail food price forecasts are prepared each month for 1 month in advance. Quarterly price forecasts are prepared for up to four quarters ahead. In addition, aggregate forecast measures are prepared in this unit for supply and utilization of all farm and food products. Although historical series on these supply and utilization indexes are published, forecasts are usually for internal working purposes only.

The methods used in this unit for forecasting retail food prices include (1) aggregation of retail food price forecasts made by commodity units in CED; (2) use of aggregate relationships for estimating retail food prices given farm price forecasts as an input; and (3) comparison of the estimates of these two methods with retail price forecasts prepared by the Market Statistics Unit. Judgment based on current market conditions and previous experience with different methods are used to derive the reported retail price forecasts for food items. Statistical aggregation of forecasts for individual commodities is primarily used for forecasting per capita food use as well as aggregate supply and use measures for all farm and food products.

Investigations based on consumer survey studies have been conducted to identify food consumption relationships for the United States as a whole and by regions. Such investigations provide parameters which are useful in forecasting and in analyzing food policies.

In terms of the broad food sector data base maintained by this unit, significant methodological considerations must be given to the procedures used for grouping and aggregating the various price and quantity series. Many of these procedures need attention as a possible source of forecast error in ERS aggregate food prices, food use, and food supply measures.

Farm Income Unit of SPM

Shortrun forecasts of farm income and farm production expenses are among the major responsibilities of this unit. Forecasts are prepared for each quarter for up to four quarters ahead, but for internal use only.

As in the case for the Demand and Price Unit and the Food Consumption Unit, an important activity in the Farm Income Unit is the development of aggregate forecast measures for the farm economy based on a flow of information on forecasted farm prices, farm marketings for individual commodities, and direct Government payments. Such information is combined with forecasts made within the Farm Income Unit for farm production expenses and nonmoney income to obtain forecasts of net farm income.

The major activities in this unit which require substantial methodological attention are (1) aggregation procedures and the concepts underlying the

forecast items and (2) development of aggregate relationships which characterize the broad interdependencies between the farm sector outputs and farm input supply sectors and between farm production expenses and the forecasted prices and quantities for farm products and inputs. Historical relationships which have provided a reasonable basis for farm production expenses, in particular, need to be reexamined in view of major changes in input and product markets.

In the late sixties and early seventies, too few analysts, competing pressures from other activities, and too little attention and no explicit responsibility to maintain methodology, have limited the evaluation of individual forecasts for inconsistencies. Strengthening the evaluation function along with investigating aggregate farm sector relationships would sharpen the overall understanding of farm input and output markets. This would have direct implications for improving shortrun forecasts of farm income and production expenses for the year ahead and would be particularly helpful for the 3-year forecasts. Additional suggestions for improving the current forecasting procedures are given in the statement on forecasting activity in the Sector Performance Measures program area in appendix A.

Inputs and Finance Unit

The Inputs and Finance Unit is responsible for analyses of the farm input markets such as labor, fertilizer, farm machinery, fuel, real estate, and farm credit. Although outlook and forecasts are prepared for these farm inputs, forecasting has not been done on a regular basis for most items. Except for fertilizer and farm credit needs, forecasts are prepared on a request basis only and rely on the extensive knowledge of a few individual analysts. Forecasts for farm credit needs and fertilizer are published annually in the Agricultural Finance Outlook and in the Fertilizer Situation. For the late 1960 and early 1970 period, little coordination existed in examining the interrelationships among developments in farm commodity markets or between forecasts for input prices and usage and aggregate farm production expenses.

Insufficient attention to these nonfarm input markets is partly due to the historic price stability and the unavailability of current information on production, use, and prices in these markets. This has largely precluded development of an adequate data base from which to derive relationships which might describe price and usage adjustments in such markets. Moreover, the stability in prices and other data limitations for these inputs severely limit the possibilities of identifying and measuring demand and supply parameters for these input markets. Nevertheless, efforts to identify input demand and supply relationships should be stepped up and new measures of the cross relationships between inputs and outputs developed if future adjustments in the total farm economy are to be well understood.

Procedures and methods used to forecast changes in the farm financial area include using systems of equations. As described in appendix A and in the section on model inventory, these equation systems provide forecasts for capital formation as well as how cash flows of capital are financed. In addition, annual changes in the balance sheet of agriculture are forecasted

along with loan funds outstanding in investors' portfolios. Conceptually, this particular model can be linked to the FRB-MIT econometric model to explore some of the monetary links between the farm and nonfarm economy. This framework appears to have substantial potential as an integral part of the aggregate outlook activity for up to 3 years ahead. Additional efforts to link the balance sheet of agriculture to the rest of the farm income accounts should be encouraged since both are an integral part of the farm investment decision process. This may, however, have to await the development of better measures of the capital stock of farm assets.

Pricing Policy and Program Analysis Program Area

The forecasting responsibilities of this program area fall primarily into the following categories: (1) theoretical investigations and empirical testing of hypotheses related closely to price determination and supply adjustments in the farm commodity and food retailing sectors; (2) estimation and evaluation of demand and supply relationships for farm and food products; (3) development of systems of equations for exploring economic adjustments across farm commodities and an analysis of how these adjustments relate to selected fiscal policies established in both the farm and nonfarm economy; (4) development and refinement of various statistical, mathematical, simulation, and econometric algorithms which find broad applications in the implementation of models in actual forecasting and policy analyses; (5) provision of technical assistance and consultation to other analysts charged with direct responsibility for implementing various forecasting methods; (6) assistance to other program groups in conducting broad economic adjustment studies in the farm economy; and (7) evaluation of shortrun forecasts and the forecast procedures used in ERS.

From an organizational point of view, there are both advantages and disadvantages in having a group primarily responsible for forecasting methodology. Viewed from the positive angle, the group (1) provides a ready exchange of ideas by analysts with different scientific backgrounds, thus facilitating development, evaluation, and eventual implementation of new methods in forecasting and policy analyses; (2) allows for development of highly specialized training and skills needed in compiling information on statistical, mathematical, economic, and other scientific methods; (3) provides a ready source of information on forecasting methodology to those who must concentrate their efforts on areas other than formal analytical techniques; (4) constitutes a focal point for varied requests on demand and supply parameters and other relationships for a broad range of commodities and food products; and (5) possesses sufficient theoretical, empirical, and policy knowledge to provide staff assistance on unusually difficult national policy and outlook issues in a timely fashion.

On the other hand, possible disadvantages of such a unit include difficulties in (1) keeping the theoretical and empirical analyses relevant to specific problems and issues faced by ERS; (2) assuring that empirical analyses do not become competitive rather than complementary over time with activities in other program areas; and (3) coordinating the mixture of staff and line functions inherent in such an organizational unit. The extent to

which these disadvantages may become more real than apparent depends mainly on how the division directors view the role of this activity within the organizational framework.

Economic Projections and Analytical Systems Program Area

Responsibilities for shortrun forecasts in EPAS include determining (1) yield estimates; (2) parity price estimates; and (3) index of prices paid for farm inputs. Procedures used to derive yield forecasts for these items greatly depend on knowledge of individual members of the yield estimates team. While some of the members may examine yield relationships, considerable judgment is required because so little is generally known about the effects of input prices in the short run. Forecasts for the prices paid series are based largely on a combination of trend estimates for some of the nonfarm inputs and price forecasts for feed and feeder livestock and the general price level. An additional important item forecasted is the farm parity index which is used in analyses of a year or longer for determining target support prices. Additional information on the activities in this program area are outlined in ERS general memorandum No. 52.

Some key summary observations on the forecasting activity in NEAD with respect to organization, methods, and staffing are as follows:

- (1) Methods and procedures still rely most heavily on qualitative rather than formal quantitative techniques.
- (2) Many of the aggregate measures forecasted are straightforward aggregations of individual price and quantity forecasts made in other divisions.
- (3) Adequate attention has not been given to many of the aggregation procedures which constitute a possible source of forecast error.
- (4) Most procedures used by analysts can apparently be documented and thus can be considered verifiable in a scientific context.
- (5) An important function of units preparing aggregate forecast measures and consolidating many individual forecasts is an overall technical review for internal consistency and general reasonability of results when viewed as a total package.
- (6) The technical review function is weak primarily because of the inadequate number of staff and the failure to achieve maximum organization effectiveness with current staff.
- (7) Inadequate attention has been given to input markets and the relationships of such inputs to farm commodity markets.
- (8) A continuous and systematic performance evaluation of the forecasting activity has been noticeably lacking in ERS. A major consequence is that few criteria have been developed and no rigorous evaluation has

been undertaken to determine the user value of ERS forecasts, the extent of various kinds of error, the adequacy of forecasting procedures and methods, or the relative priorities on activities within the forecasting area. Performance evaluation should be a continuing activity in view of the major responsibility for forecasting in ERS.

- (9) While many of the previous comments focus mostly on some of the shortcomings of the program, it should be remembered that ERS is one of the few public agencies that regularly publishes and widely disseminates forecasts that are of key interest to farmers, agribusiness firms, consumers, and various other Government and private decisionmakers.

In the Foreign Demand and Competition Division (FDCD) 11/

The Foreign Demand and Competition Division (FDCD) currently has two projects which fit into the regular forecasting activity--U.S. agricultural trade forecasts and world agricultural production indices.

Agricultural Trade Forecasts

One-year forecasts of U.S. agricultural exports and imports, by major commodity groups and regions are published biannually in Outlook for U.S. Agricultural Exports, a joint publication by ERS and FAS, as well as in FAS' Foreign Agriculture. These basic forecasts are often modified and updated as market developments change. Current plans are to extend these forecasts to a quarterly basis in the future.

The forecasting process for agricultural trade primarily consists of coordinating and summarizing. The process is started by sending each country analyst a computer printout listing the quantity and value of both U.S. exports and imports covering the previous 2 years, by commodity group for a particular country. A rough estimate of average prices for the coming year is also supplied. The printout has space for the next year's forecast for both quantity and value of U.S. exports and imports. The analysts' record their forecasts on these sheets and return them to the central coordinator.

The techniques and methods used by the country analysts in making these forecasts generally fall into the following categories:

- (1) Trend extrapolation of data.
- (2) Trend extrapolation of data adjusted by the analysts' best judgment of market conditions.

^{11/} Material presented in this section was prepared by William Kost, agricultural economist, FDCD, ERS.

(3) Forecasts or estimates provided by analysts outside ERS.

(4) Forecasts or estimates provided by analysts outside ERS and adjusted by the analysts' considerations of market conditions.

The country forecasts are then summed to obtain (1) commodity and country totals, (2) commodity groupings and regional totals, and (3) world totals for U.S. agricultural exports and imports. The totals are compared with commodity estimates arrived at independently by the FAS. These two sets of forecasts are reconciled prior to publication in Outlook for U.S. Agricultural Exports and Foreign Agriculture.

Rough monthly U.S. export forecasts are also made for a "Highlights" report that is sent to the ERS Administrator. These are judgment forecasts based on inspection and trade reports.

World Production Indices

Annual indices of agricultural production by country and commodity are estimated in November for the current calendar year and are then revised the following February or March.

In November, each country analyst receives a computer printout listing 4 years of production data by commodity. The analyst is asked to review the data for accuracy and then to estimate a fifth (current) year's production, based primarily on published reports from the country and attache reports. Since the estimates are made in November for the current year, little forecasting is actually done. It is, in large part, a case of reporting the most current information from a country. However, a major concern of the country analyst is one of data conversion--conversion to the proper time frame and units of measure. The printout sheets with the revised 5-year production series are then returned to a central coordinator for time series consistency checks, coding, and computer calculation of Laspeyres indices of agricultural production by country and commodity. The February-March cycle is essentially the same, except that the country analysts' November estimate is returned with the previous 4 years of data for reviewing and updating.

These indices of agricultural production in foreign countries have been prepared since World War II. During and immediately after the war, the effort focused on Europe. However, since the midfifties, special attention has been given to the less developed countries because of an arrangement with the Agency for International Development (AID), whereby USDA prepares annual reports on the volume of agricultural production in most countries which are AID recipients. The estimates for the November indices are used internally and are not published. The indices available in February-March are published but not in any single source.

Although FDICD carries out other forecasting work on both a short and longrun basis, the two areas discussed above are the only ones in which regular forecasts are made. The rationale for this situation includes at least the following two aspects.

One of the responsibilities of the division is the service oriented mission of gathering international agricultural intelligence. In this role, FDCE is often called up on to make specific forecasts for various projects. Thus, most of the forecasting work falls in the one-time-only category.

Also, a memo dated May 22, 1961 apportioned the duties relating to work in the international agricultural area between FAS and ERS. This memo was interpreted as placing the major shortrun forecasting responsibilities for the international area in FAS. ERS was to serve in a consulting, reviewing, and advising capacity, and thus little regular forecasting work was done in FDCE. However, a more recent Secretary's memo on interagency commodity estimates committees, a copy of which is in appendix B, delineates individual agency responsibilities in the international area and specifies more clearly the role of ERS in regular international forecasting activities.

Conclusions

With the increasing importance of the international market, higher priority needs to be placed on developing regular international forecasts in ERS. To complement FAS' work, the ERS contribution should be one of developing a more systematic, quantitative, and objective approach to regular forecasting through modeling. This would be complementary in three different ways. (1) It would provide a more systematic method (or model) by which FAS could approach its forecasting responsibilities. (2) It could provide separate ERS forecasts of the international agricultural situation, thus providing an independent basis for comparison of FAS forecasts as well as providing the necessary inputs to fit the needs of ERS' overall domestic forecasting mission. (3) Finally, by emphasizing this modeling-forecasting objective in the international area, a more cohesive frame of reference would be developed for FDCE's existing research program. This could provide more and better criteria for judging which research proposals to accept.

Moving in this direction would require work in the following broad areas:

- (1) Determination of relevant forecast variables.
- (2) Development of an automated international data base.
- (3) Development of a series of common objectives for the country analysts with respect to the overall forecasting objective. This step would require evaluation of the analysts' role in developing an international data base and a strong commitment by management to an ongoing forecasting activity. Large initial efforts would be necessary to start such a regular forecasting program.
- (4) Development of simple, automated, quantitative techniques that can be utilized by the country analysts in making forecasts. This step would require more than just development of a simple user-oriented model. A major additional activity would involve improving the quantitative skills of the analysts as well as training those persons actually responsible for forecasting in model development and use.

- (5) Development of an automated process whereby forecasts of the individual country analysts can be summarized across commodity and country lines.
- (6) Development of more complex structural commodity and country forecasting models.

In order for the people working on forecasting models to have some insulation from the current intelligence and situation work, a separate but not isolated unit of the type described above should be created to house an international outlook program. Without this group being administratively separate, it would be too easy to draw these resources into the daily "brush-fire" projects that arise. However, the unit must be an innovative unit that works with and across the more operational units in developing forecasting techniques.

How comprehensive such a program could be and how fast it would be developed and instituted would depend upon the resources (both personnel and computer funds) allocated to it. Only a limited amount of resources could be transferred from other program areas in the division without severely impeding their missions. Also, new skills would be needed, particularly in the areas of economic modeling, programming-systems analysis, and operations research, thus requiring new support and professional personnel.

ADDENDUM

Subsequent to completion of the first part of the present study in which the previous description and documentation was accomplished, and partially as a consequence of its early results, conclusions, and recommendations, several organizational and procedural changes have occurred at the agency level and in the three divisions of the Food and Fiber Economics Sector that have direct bearing on ERS outlook and forecasting. Since these changes have preceded publication of the report, it was felt that perhaps the more salient aspects of these changes should be summarized here for completeness and to maintain proper perspective.

Agency Level Changes

Data Services Center

Recognition of the need to improve the quantity and quality of data available for research and to improve the use of computer technology in managing and analyzing data led to the establishment of the Data Services Center (DSC). This new part of the agency was created in July 1975 and is attached to the Office of the Administrator.

The primary functions of DSC are to (1) work with the ERS research staff and the many agencies and organizations supplying data to ERS to improve the quantity and quality of data available, (2) develop and operate automated data management and analysis systems to support the research program, and (3)

provide data processing support for programming, systems development, and scientific application needs of the research staff.

The initial focus of work by this new organization is to design and develop a capability for generalized data documentation, data management, and data analysis systems; to automate data used in high priority agency research; to continue to provide data processing services for the many requests made by researchers; and to develop the annual Economic Survey of Agriculture. This survey is a major new program to provide a flow of data needed by ERS from the farming sector, including data to improve the farm income accounts, to measure the cost of producing major farm commodities, and to measure the use of purchased inputs.

Publications

A task force was established in 1974 and given the charge to review, evaluate, and make recommendations concerning ERS outlook and situation publications. USDA representation on the task force included ERS, SRS, FAS, and the Office of Communication.

The task force made a number of recommendations to the Administrator of ERS, including the following:

The general situation reports should be combined into two reports. The first would combine all the general agricultural reports. The other would be an aggregate report for those whose primary interest is food. No recommendation was made to combine commodity situation reports, but several combinations of reports were indicated to be desirable. There should be greater joint input between ERS and FAS in the preparation of commodity situation reports.

Expand the analysis of the outlook for sugar as well as several other commodities.

As a result of the task force recommendations, a number of situation reports were discontinued and several new or revised reports were published to improve outlook information to the general public. Agricultural Outlook is published monthly and contains a discussion of major agricultural aggregates as well as a brief outlook for major commodities. Cotton and Wool Situations were combined into one report and a new publication, Sugar and Sweetener Report, has been added to the commodity series.

Outlook and Situation Officer

The role and function of the Outlook and Situation Officer was reviewed in 1975, and as a result, the position was assigned additional duties and responsibilities for supervision and coordination in the development of outlook and situation information, including the work on shortrun forecasts. The position was also assigned a leadership role in the development,

implementation, and coordination of outlook and related research in development of tools and analytical techniques which support the outlook work.

Food and Fiber Economics Division Changes

Commodity Economics Division

In mid-1974, a Forecast Support Group, was established in CED and attached to the Director's office. This group was composed of analysts working on the development of quantitative economic models of the agricultural commodity sector. The primary purpose of this group was to provide analytical support to outlook and situation commodity analysts in the various commodity program areas in CED. This support was to be accomplished (1) through the development and operation of a comprehensive quantitative economic model system for commodity specific forecasting; (2) through the development and implementation of a system for periodic, objective evaluation of forecast performance and a framework for documentation of forecasts and forecasting procedures in FFE; and (3) by the provision of technical assistance on models and methods. To facilitate implementation of the functions of this group, personnel with quantitative economic skills were added to individual commodity program areas. In addition, specific attention was focused on improving the flow of information in the forecasting process and coordinating the various activities and forecast review. These latter functions were made the responsibility of the outlook and situation coordinator in the division who is also attached to the Office of Director. Special emphasis was placed on providing commodity analysts with the forecast output from the comprehensive model system at the beginning of the forecasting process. In early 1975, additional adjustments were made in the organization and function of the CED Forecast Support Group. Personnel were added to the group and the group was given the additional responsibility of assisting the outlook and situation coordinator in implementing procedures for performing the coordination and review functions within CED and among the FFE divisions.

National Economic Analysis Division

Within NEAD, personnel were realigned to provide greater analytical support for the outlook and forecasting function. Activities of the previous Demand and Price Unit were moved to the SPM program area in conjunction with personnel movements and additions to provide a nucleus of quantitative analytical support for the outlook and forecasting function through the development of aggregate economic models of the agricultural sector. The outlook and situation coordinator position was also given additional responsibility for coordination and review of the division's outlook and forecasting function, as well as supervisory and coordinating responsibility for the development and implementation of the aggregate sector models and systems.

In addition, an ERS task force was established to review, evaluate, and make recommendations concerning farm income estimates and forecasts. The task force made major recommendations regarding (1) changes in various items in the

farm income accounts; (2) additional data to support the development of farm income estimates and forecasts; (3) intraagency and interagency working relationships; and (4) higher agency priority and additional staffing for farm income work.

The following changes have been made to implement some of the task force recommendations: (1) an annual economic survey has been instituted to gather additional data; (2) State measures of net income in February have been eliminated; (3) commodity specialists are regularly consulted in estimating marketings and inventory levels of farm products; (4) SRS is providing data on a more timely basis to estimate the marketing distribution of crops during a crop year; and (5) stringent requirements for publication of farm income data due to interagency agreements have been relaxed.

Foreign Demand and Competition Division

In early 1975, a separate project--Models for Forecasting U.S. Agricultural Exports, was established in the Commodities program area, FDCD, with essentially the same primary purpose as the CED Forecast Support Group. The FDCD outlook and situation coordinator was given additional responsibility for development, coordination, and review of the outlook and forecast information in FDCD. The forecast support project was given responsibility for (1) developing user-oriented models to provide a more systematic, quantitative, and objective approach to forecasting, (2) developing procedures and systems to support FDCD's situation and outlook efforts, and (3) providing methodological assistance for the export forecasting work of the country and commodity analysts and the outlook and situation coordinator.

ANALYSIS AND EVALUATION OF FORECAST PROCEDURES AND PERFORMANCE

Background

From a general viewpoint, forecasting can be characterized as bringing together information that is known with some degree of certainty with a procedure for combining the information to produce a forecast of some event that is known with a lesser degree of uncertainty. However, for analytical purposes, it is necessary to be more specific about a forecast and its components. Following the approach of Theil, a scientific forecast consists of at least two important inputs: some theory, no matter how naive, and some observations, however few and unreliable they may be. ^{12/} In relation to the general statement above, the theory is embodied in the procedure.

The theory always carries with it, either implicitly or explicitly, an assumption that something remains constant. For example, at one extreme there is the naive no-change prediction which assumes constancy about the whole situation, including the event predicted. Somewhat less naive is the linear extrapolation which assumes that the rate of change is constant for the

^{12/} Theil, Henri, Applied Economic Forecasting, North Holland, 1971.

predicted variable. A much more sophisticated theory underlies the input-output forecasting technique, which assumes that a complete set of coefficients remains constant over time.

There is a very close relationship between the theory and data requirements. Broadly speaking, the more sophisticated the theory, the more demanding the data requirements. For example, the no-change prediction requires only one observation, the linear extrapolation requires at least two, and the input-output technique requires a complete input-output table.

The definition of a scientific forecast also requires that both the forecast and the procedure be verifiable. Regarding the forecast, it must be possible to conclude unambiguously after a certain period of time whether the prediction is true or false, and both of these must exist as possibilities. Further, there should be no ambiguity regarding the concepts defining a prediction or the time interval to which it refers. Regarding procedures, the basic requirement is that the line of thought which led to the forecast be verifiable. This implies that such a line of thought exists, that it can be understood by others, and that these people agree that the procedure is reasonable, given the purpose for which the forecast is made, the resources available, and the state of the art and scientific standards of the moment.

A forecast is a statement about unknown events which are important in a decisionmaking process. A forecast is useful if it reduces the uncertainty level of the outcome of a decision process below that which would prevail without the forecast. And, the most useful forecast is determined by the greatest degree of reduction in uncertainty. Consequently, the usefulness of a forecast and forecasting device must be evaluated in terms of the effect on the outcome of the decision process. This entails determining the amount and kind of forecast error. But this is only part of forecast evaluation. In order to improve forecasting performance, it is necessary to determine the source of forecast error. Thus, forecast evaluation can be characterized as consisting of three major components: (1) determining the amount and kind of forecast error, (2) determining the source of error, and (3) determining the effects of error. Figure 2 illustrates these components.

Technical Considerations in Forecast Evaluation

Determining Forecast Error

In evaluating the accuracy of the forecast values themselves, we can distinguish three general types of error: (1) underestimation, (2) overestimation, and (3) turning point. If we extend our consideration to error in procedures by which forecasts are made, we can distinguish additional types of forecasting errors. Given the various kinds of errors, there are a number of ways of measuring these errors, each of which may have a particular advantage, depending upon the purpose of the forecast. The following is a

Forecast Evaluation

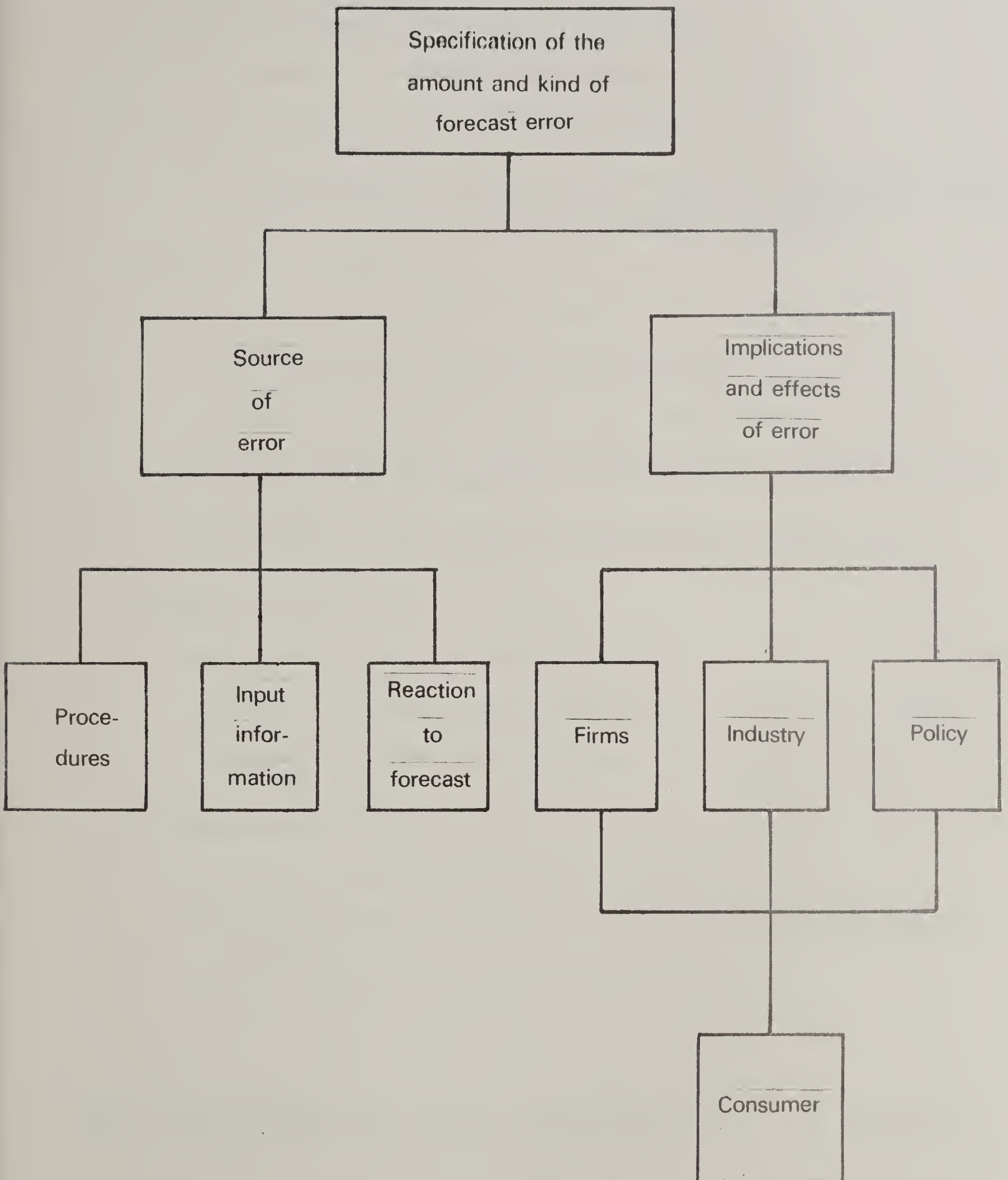


Figure 2

list of some of the various types of descriptive measures set out in an article by Dhrymes. 13/

(1) Single-variable measures

- (a) Mean forecast error (changes and levels)
- (b) Mean absolute forecast error (changes and levels)
- (c) Mean squared error (changes and levels)
- (d) Any of the above relative to (1) the level or variability of the variable being predicted, or (2) a measure of acceptable forecast error for alternative forecasting needs and horizons

(2) Tracking measures

- (a) Number of turning points missed
- (b) Number of turning points falsely predicted
- (c) Number of underpredictions or overpredictions
- (d) Rank correlation of predicted actual changes (within a subset of important actual movements)
- (e) Various tests of randomness of directional predictions or predicted turning points

(3) Error decompositions

- (a) Bias and variance of forecast error
- (b) Errors in startup position versus errors in predicted changes
- (c) Identification of model subsectors transmitting errors to other sectors

(4) Comparative errors

- (a) Comparison with various naive forecasts
- (b) Comparison with judgmental, consensus, or other noneconometric forecasts
- (c) Comparison with other econometric forecasts

13/ Dhrymes, Phoebus, and others, "Criteria for Evaluation of Econometric Models," Annals of Economic and Social Measurement, Vol. 1, No. 3, July 1972.

(5) Cyclical and dynamic properties

(a) Impact and dynamic multipliers

(b) Frequency response characteristics

Comparative Evaluation

Inherent in the large array of various forecast evaluation measures above is the implication that forecasts and forecast procedures can be evaluated from many different viewpoints. It is important to recognize the meaning of these differences in arriving at conclusions.

A case in point is the distinction between a track-record evaluation and comparative evaluation. For example, an evaluation of a consecutive series of forecasts (track-record) may show that a particular forecast value at one point in time was in error, say, by 2 percent, while at another time, the error was 40 percent. A criterion of "acceptable level of error" of 5 percent or less could be applied and the conclusion drawn that the first forecast is not only acceptable but very good, whereas the second forecast which has an error level 8 times that of an acceptable level is a very poor forecast. On the other hand, a comparative evaluation of different forecasts of the same event under the same set of circumstances might reach just the opposite conclusion. For example, this could happen if the first forecast with the 2-percent error is compared with all known alternatives and found to have at least 50 percent greater error than any other forecast, and the second forecast with a 40-percent error is found to have 20 percent less error than any alternative forecast. This important point should be kept in mind in assessing any empirical evaluation of forecasts or forecast procedures.

Source of Forecast Error

Very little formal or systematic forecast evaluation has focused on determining the source of forecast error. As a result, standard methods, techniques, and approaches are not available. Most of what is available has been developed in conjunction with the work on measuring forecast error, largely from attempts to evaluate formal econometric models. Consequently, a well-defined, comprehensive discussion of this subject is neither possible nor intended at this time. However, several broad categories can be delineated as major sources of error. These include the two components of a forecast--procedures and input information, in addition to the errors that result from reaction to the forecast itself.

In a forecasting activity such as that of ERS in which there is a great deal of specialization, procedures include the coordination of the interdependent activities as well as the methods and techniques employed by any separate unit or activity. Both of these constitute possible sources of forecast error. What few formal measures exist for determining the source of error are at best applicable to the individual forecasting activities, and even then, almost entirely to the formal techniques and methods employed.

Most of these are included under the heading error composition in the previous section.

There are two types of input information used in conjunction with the procedure to generate a forecast--qualitative and quantitative. Each constitutes a potential source of error. Determination of error in the quantitative data input can be accomplished with standard statistical measures but no such standard methods exist for determining the error resulting from the qualitative information input. While the latter is perhaps no less an important source of error, its assessment must proceed for the present on a largely ad hoc, exploratory basis.

Forecast error that results from the users' reaction to a forecast has been recognized as a source of error, but few guidelines if any exist for empirically determining its effect.

Implications of Forecast Error 14/

This section discusses the implications of forecast error as it relates to firms, the industry, consumers, and policy. This discussion is not directly concerned with the actual deviation of predicted values from actual values, but rather with the effects such an error may have on the public and private sectors of the economy.

A statement made 20 years ago by Earl O. Heady is unfortunately still true in some respects today. 15/

Only scattered quantitative inferences are available on how the agricultural firm formulates expectations, how planning is carried on in light of these expectations, and how uncertainty results, ex post, in inefficient use of resources. More research in these areas is needed.

More research is needed to answer some of the questions raised in evaluating the implications of forecast error. Some of these unanswered questions are:

- (1) How are expectations formed? That is, how are official forecasts used and what is their relationship to the total decision process?
- (2) How do expectations enter into the planning process? For example, are the users willing and able to revise plans on the basis of information contained in a forecast? With respect to this point, it should be

14/ Material in this section was prepared by Rodney C. Kite, agricultural economist, CED, ERS.

15/ Heady, "Earl O. and D. R. Kaldor, Expectations and Errors in Forecasting Agricultural Prices," Jour. of Polit. Econ., Vol. LVII, No. 1, Feb. 1954.

recognized that, aside from credibility, the timing of the forecast will have significant implications.

- (3) How and to what degree does uncertainty affect the efficient use of resources? This point is the culmination of the interaction of all factors entering into the first two points. It is evident that the need for forecasting derives from uncertainty about the future. Under specified conditions it is known that reduction of uncertainty contributes to more efficient resource use and thereby to an increase in general welfare.

Economic forecasts are an input into a decision process and they are one of many ingredients which, if properly mixed and measured, supply information necessary for making good decisions. Likewise, wrong forecasts can lead to bad decisions. In this context, we may measure the implications of forecast error in terms of how a good forecast contributes to making good decisions and how a bad forecast impedes good decisionmaking. However, to make this determination, it is necessary to know how the forecasts are being used.

In the realm of public policy, for example, a forecast error may lead to inefficient use of public resources, in the sense that too few or too many funds and personnel may be committed to the solution of a problem in relation to possible social gains. This may be true especially when the forecasts are made by a public agency. Hayami and Peterson, for example, report that each dollar spent on reducing the error of SRS estimates of production for major commodities from the 3-percent error level to a 2.5-percent level would return over \$800 in social benefits. ^{16/} They point out, however, that their estimate is very rough and is primarily intended to demonstrate a method for assessing some implications of forecast error. Possibly, with modification, their methodology can provide a tool for further analysis of the social implication of forecast error.

Forecast errors can also be evaluated in terms of their effect on price stability. This effect results from producers and consumers forming production and consumption decisions from forecasts. It has been suggested that this aspect of forecast error can be analyzed by using the Cobweb model. Some information provided by the Cobweb framework is summarized in table 1. The table serves to emphasize two factors which must enter into an analysis of the effects of forecast error--the degree of accuracy and the degree of public acceptance. Generally, we can expect that publication of forecasts which are less than correct will lead to reduced client acceptance, and in the case of large error, to total disregard or at least an increase in speculation. In the most likely case of partially accepted, less-than-correct-forecasts, we can expect that price variation will be reduced but that some variation will remain. Further empirical investigation of this case is certainly warranted. By combining some aspects of the Hayami-Peterson methodology, one might obtain some measures of the benefit and cost of price stabilization. Most of the

^{16/} Hayami, Y. and Willis Peterson, "Social Returns to Public Information Services: Statistical Reporting of U.S. Farm Commodities," Amer. Econ. Rev., March 1972.

Table 1 -- Effects of forecasting on the Cobweb cycle

Client acceptance: of forecast	Nature of forecast	
	Correct	Less than correct
Ignored	Cycle is uninhibited	Cycle is uninhibited
Partially accepted	A. Cycle is dampened B. Prices move quickly to equilibrium	A. Cycle is dampened B. Permanent movement about equilibrium
Fully accepted	A. Stable equilibrium	A. Large oscillation removed B. Permanent movement about equilibrium

Source: Rothschild, K.W. Cobweb Cycles and Partially Correct Forecasting. The Quart. Jour. of Econ., Vol. LXVII, No. 3, June 1964.

work to date has concentrated on production, but there are similar considerations for consumption that are equally important.

The effects of forecast error may also be analyzed at the microlevel. From this point of view, we get to the very core of the effects of forecast error. When associating with individual clients, one may encounter problems of measurement and analysis not found at the macrolevel. For example, it may be necessary to recognize that response to forecast error is not continuous at the microlevel--that is, the same decisions would be made over a range of accuracy levels. This factor will introduce some complications into measuring the effects of error, especially in measuring effects resulting from changes in accuracy.

Most microlevel work dealing with forecast accuracy has been conceptual rather than empirical. In 1961, Nelson developed a framework which may hold promise for empirical work.^{17/} Using a perfectly competitive, profit-maximizing firm facing a varying price, Nelson concluded that the cost of uncertainty (in terms of profit loss) is an increasing function of price variance and a decreasing function of marginal cost. He also concluded that the firm's supply curve became more elastic as forecast error decreased. Therefore, we may conclude that reduction in forecast error will tend to increase a firm's profit as well as increase its responsiveness to changing expectations.

Nelson extended his analysis to implications at the industry level, under the assumption that the industry faced a varying demand curve. He concluded that an increase in predictive ability would (1) increase industry profits, (2) increase the elasticity of supply, (3) reduce price variance, and (4) decrease the equilibrium price and increase output under free entry.

This brief presentation of the effect of forecast error on social welfare, the firm, and the industry does not cover all of the writing on the problem. It is intended to present some of what we know about the effects of forecast error and to point to some of the many possibilities for further analysis. The observation made by Heady in 1954, that there was little quantitative information available, remains true today. Many of the conclusions presented here must be taken as tentative proposals until more solid empirical measurements on these phenomena are available.

Evaluation of ERS Forecasts

On the surface, an evaluation of ERS forecasts does not appear to be an unusually difficult task. But this illusion is, in part, based on the presumption that ERS forecasts result from a very structured analytical approach. In such a framework, it should be possible to easily recover historical forecasts, review the logic used in making these forecasts, and

^{17/} Nelson, R. R. "Uncertainty, Prediction, and Competitive Equilibrium," Quart. Jour. of Econ., Vol. LXXV, No. 1, Feb. 1961.

evaluate them. This would, of course, provide some basis for answering questions such as: Are our demand parameters adequate? Can we estimate prices given that quantities are accurately estimated?

After some initial probing, it was found that there are a number of difficulties inherent in the above mentioned task. A major problem is obtaining sufficiently explicit basic information on the forecasts and the assumptions and other information used to produce them. Many of the published ERS forecasts are stated in a highly qualitative way that does not permit explicit documentation. Even where this is possible, it cannot usually be done for a period sufficiently long enough to permit analysis. Furthermore, the assumptions and data inputs underlying the USDA forecasts are not easily recovered, and in many cases are lost. Another major area of difficulty is deciding how to evaluate the forecasts, given a sufficiently long historical record. Resolution of this complex issue is not attempted. Instead, several alternative measures are somewhat arbitrarily employed to illustrate their use in evaluating ERS forecasts.

In lieu of a long forecast record where the forecasting assumptions and logic can be reconstructed and compared with alternative schemes, a shorter forecast record for key ERS forecasts is examined. Several measures are computed to provide some basis for examining size and type of errors in the forecasts. While numerous measures can be computed, the present analysis is limited to only three--percentage error, Theil-U coefficient, and revision ratio. In a more comprehensive and continuous evaluation program, other statistical measures can be computed that would shed additional light on the errors in current forecasting procedures. Based on these rather simple measures, several tentative hypotheses and observations on the performance of ERS forecasts are made.

ERS Forecast Record

Data for the ERS forecast record was compiled from the internal ERS document referred to as the "Quarterly Memo," which presumably shows the explicit numbers used as a basis for the forecasts presented in ERS situation reports (app. D). The forecasts are typically made four times a year for four quarters ahead.

For example, the first forecast for the first calendar quarter is made during the second quarter of the previous year; a second forecast is made for the first quarter during the third quarter of the previous year, and so on. While this general procedure has a number of exceptions, the forecast record is set up in this format. All of the forecasts for a given item are summarized on one table to facilitate easy comparison of errors over the total period, as well as comparison of forecast errors in successive forecasts for a given quarter.

Statistical measures.--Computation of percentage error in the forecasts is one simple measure for identifying the relative magnitude of forecast error. It does not necessarily indicate how good the forecasts are in a comparative sense between commodities and may be misleading in this context. Two series

which have markedly different variations should at least be normalized for their variance before making such a comparison.

A somewhat better comparative measure of forecast performance is obtained with the Theil-U value, which permits comparison of a given forecast with a naive, no-change forecast. 18/ A Theil-U value of one suggests that the given forecasts are no better than a simple no-change forecast. A Theil-U of less than one implies that the forecasts are better than a no-change forecast; a value greater than one suggests that the forecasts are worse than a no-change forecast.

Of interest to the forecast record is the revision or updating of a forecast for a given quarter as that quarter is approached. A measure (R) presented by Theil--the revision ratio--is computed to show how "successful" each revision is. 19/ An R value between 0 and 2 indicates a successful revision in the sense that the revised forecast is closer to the realized value than was the original forecast. An R value less than zero or greater than 2 indicates an "unsuccessful" revision, in the sense that the revision is farther away from the actual value than was the earlier forecast. 20/ As with other measures, it should be remembered that the revision ratio must be interpreted with care.

Observations and results.--Based on a short historical record of ERS consensus price forecasts for 1966-74, the following tentative observations and results are presented: 21/

- (1) Forecasts for index of prices received for all farm commodities were underestimated more than two-thirds of the time.
- (2) The average percentage error for the index of prices received was about 8 percent for the first forecast and less than 3 percent for the fourth forecast.
- (3) The range of forecast error was from less than 1 percent to 35 percent for the first forecast made and from zero to 11 percent for the fourth forecast made for the index of prices received.
- (4) Based on the Theil-U, the first forecasts for the index of prices received were not much different from the results that would have been obtained with a no-change forecast. Significant improvement over the no-change forecast was obtained in each succeeding forecast period.
- (5) Based on the revision ratio, from two-thirds to seven-eighths of the successive revisions were successful (the revised forecast is closer to the actual outcome) for the three indexes of prices received.

18/ A more detailed discussion of the Theil-U coefficient is contained in app. D.

19/ Theil, Henri, Economic Forecasts and Policy, North Holland, 1961, p. 62.

20/ A more detailed discussion of the revision ratio is contained in app. D.

21/ See app. D for ERS forecast records.

- (6) In one-half to two-thirds of the successful revisions in the indexes of prices received, the changes were underestimated.
- (7) Of the unsuccessful revisions in the indexes of prices received, by far the greatest percentage was in the wrong direction.
- (8) Somewhat unexpectedly, errors in livestock price forecasts were a little smaller than those for crops.
- (9) Farm price forecasts for major crops have a tendency toward underestimation bias, while forecasts for minor crops tend to exhibit a more random pattern of forecast errors.
- (10) While farm prices for most livestock products tend to be underestimated, forecasts for turkeys and lambs display a more random pattern of forecast errors.

Though data on ERS forecasts could only be obtained as far back as late 1970 for farm income and other more aggregate measures, some very tentative observations can be based on data for 1971, 1972, 1973, and 1974:

- (1) Government payments have been overestimated about half of the time since 1971.
- (2) Based on the limited number of observations, cash receipts from crops, livestock and products, and all farm commodities have been underestimated two-thirds of the time since 1971. However, since the same has been true for forecasts of farm production expenses, absolute percentage errors in forecasts for realized net farm income have been somewhat smaller. The relatively high absolute percentage error in cash receipts is a result of underestimation in both farm prices and volume of marketings.
- (3) Forecasts of the consumer price index (CPI) for all items and per capita consumer disposal income have very little error and thus contribute little to errors in other ERS forecasts which use such information for data inputs.
- (4) Forecasts of the CPI for all food contained relatively small errors until early 1973. Errors in 1973 can be traced mostly to large underestimation errors in farm price forecasts during 1972 and 1973 for both livestock and crop products.

Conclusions

Based on the short ERS forecast record, for illustrative purposes the following tentative conclusions can be drawn:

- (1) Farm price forecasts for most commodities are typically underestimated. The extent and nature of this bias can probably be better determined by decomposition and further analysis.

(2) Underestimation bias in both farm prices and farm marketings contributes to an even larger bias in gross and net farm income forecasts. Further investigation is needed to determine the basis for this underestimation bias in both marketings and prices.

(3) A longer up-to-date record of ERS forecasts would provide a more reliable basis for judging consensus forecasts and provide a basis for more constructive observations.

Comparative Forecast Evaluation

The importance and relevance of comparative forecast evaluation has been indicated earlier. However, this type of analysis requires the availability of alternative forecasts and forecasting schemes (econometric models, autoregressive moving average models, and so forth) that are comparable, along with the appropriate corresponding data and assumptions. But for most commodities this is not the case. In view of this situation, only a couple of formal models and a futures price forecasting scheme are employed to illustrate how these methods might be used in forecast evaluation.

Futures Market Quotations vs. ERS Forecasts 22/

One of the more meaningful approaches in evaluating a given forecasting procedure is to compare its performance with that of an alternative procedure. The earlier discussion of ERS' forecasting record utilized several performance measures--percentage error, revision ratio, and the Theil-U statistic. Of these, Theil-U, in and of itself, provides the type of comparative aspect which this section illustrates further. 23/

An alternative to ERS' consensus forecasting approach is utilization of futures quotations from selected major commodity exchanges. Such a procedure has been applied to the quarterly forecasting of corn, wheat, and soybean farm prices. By simulating the timing pattern generally associated with ERS' internal forecasting, several sets of forecasting records have been generated which illustrate verifiable alternatives to the corresponding three ERS price forecast records.

Procedural considerations.--As described in an earlier section, ERS forecasts of quarterly farm prices are made in the first month of each calendar quarter. At such times, forecasts are prepared for the following three quarters, plus a final forecast for that quarter. Thus, for each item forecasted, the forecast record generally consists of four forecasted values per quarter. The timing of these forecasts is illustrated in the following

22/ Material in this section was prepared by Steven Guebert, agricultural economist, NEAD, ERS.

23/ In essence, the Theil-U statistic ranks a given procedure relative to a naive predictor's standard error of predicted and realized changes. The reader is referred to app. D for computational detail and additional discussion.

partial table using the quarters for 1970, where the forecasts are replaced by the approximate date the forecast would have been made.

<u>Quarter</u>	<u>Forecast</u>			
	<u>First</u>	<u>Second</u>	<u>Third</u>	<u>Fourth</u>
1970 I	April 69	July 69	Oct. 69	Jan. 70
1970 II	July 69	Oct. 69	Jan. 70	April 70
1970 III	Oct. 69	Jan. 70	April 70	July 70
1970 IV	Jan. 70	April 70	July 70	Oct. 70

(Note from this illustration that concurrently prepared forecasts appear along left-to-right upward-sloping diagonals).

The futures market forecasting method employed here uses closing quotations for the middle of the same months used in formulating ERS forecasting records. Only the general scheme of this method is outlined here with the aid of a specific example using soybeans. ^{24/} Futures contracts for a given commodity are selected to represent quarters according to the maturity month of the contract. For example, the November 1970 soybean contract on the Chicago Board of Trade was used for forecasting the fourth quarter 1970 soybean price. An adjustment factor unique to that contract was computed by taking the average price differential between the final contract prices of the preceding four November contracts and the average soybean prices received by farmers during the corresponding fourth quarters. This factor, which was computed to be 18.57 cents, was subtracted from the midmonth January, April, July, and October quotations on the November 1970 futures contract for soybeans. This yielded farm price forecasts of \$2.28, \$2.38, \$2.81, and \$2.79 for the fourth quarter. These figures compare with the ERS forecast of \$2.25, \$2.30, \$2.35, and \$2.75 and the reported or realized value of \$2.80.

Clearly the futures procedure is simplistic. One or more contracts represent a quarter for each commodity. Recent differentials between the price of a mature contract and the average farm price during the quarter are used to compute moving-average adjustment factors. These factors are subtracted from the quotations which are observed midmonth during the first month of each calendar quarter. The procedure simulates ERS' activity with respect to timing and generates forecast records illustrative of what could have been comparable alternative forecasts during recent years. The procedure is not proposed as the best use of futures quotations in quarterly farm price forecasting, and ERS' forecasting does not ignore futures quotations. ^{25/}

^{24/} A working paper gives details of the procedures for each commodity. The paper, Future Market Quotations as Forecasts: An Exploratory Examination, by Steven Guebert, NEAD, ERS, is available upon request.

^{25/} The computation and application of an adjustment factor is a major area where the commodity analyst would likely bring his informed opinion to bear in a given situation.

Analytical considerations.--The three statistical measures used in evaluating ERS' forecasting record have been computed for the futures forecasting record for 1966-73, or 32 quarters. Over the full period, the two forecasting approaches performed on a near par with each other. However, as shown in tables 2 and 3, several statistical measures do favor the use of the futures quotations, although no formal statistical tests for significant differences between measures for the two approaches have been conducted. The study deals with an important group of commodities, but the sample is fairly small. In addition, the results are clearly sensitive to the timespan included. After examining statistics for the past 8 years, the impacts of the rather volatile 1973 price situation were given closer scrutiny. For the 7 years prior to 1973, the statistical measures do not suggest a generally preferred method.

Over the period 1966 through 1973, the most notable general observation was that performance of both forecast approaches was about equally poor for first and second forecasts. ^{26/} Recall that a first forecast is made three quarters in advance, and a second two quarters in advance. A third forecast is made early in one quarter for the following quarter, while a final forecast is made during the quarter being forecast. It is for the third and fourth forecasts that the statistical measures most strongly favor the futures method of forecasting. In terms of average absolute forecast errors, table 2 shows this method to be better than the ERS approach except for the first attempt on the corn price. A comparison of the Theil-U statistics over the same period provides a stronger endorsement of the futures method. Table 3 shows that these statistics are uniformly lower for the futures approach. Even though many of the differences are fairly small and would likely test out as being individually insignificant, the overall pattern of consistency is difficult to ignore. However, this general result is greatly altered upon removal of the 1973 observations as the following discussion clearly demonstrates.

Given the method of computing the Theil-U statistics, a value of unity could be attained by simply using the previous actual value for a given quarter as the next predicted value. The Theil-U statistic ranks a particular forecasting approach relative to the simple extrapolator's standard error of forecast. The values in table 3 indicate that for the overall period neither approach offered much improvement over this simple predictor until the third forecast attempt. Using the standard error of forecast criterion, the extrapolator would actually have been better than ERS for the first forecasts. However, it is of interest to note that the naive predictor would have been associated with average absolute percentage forecast errors of 15.48, 13.63, and 14.64 for corn, soybeans, and wheat, respectively. Table 2 shows that these averages are uniformly higher than those of both approaches starting with the second forecasts, as well as being higher in two of six cases for first forecasts.

The distribution of revision ratios in table 4 also favors the futures method, but this result is somewhat misleading. Successful revisions are defined by values between .01 and 1.99. Since ERS tends not to revise a

^{26/} The detailed forecasting records are contained in app. D.

Table 2 --Average absolute percentage forecast errors in farm prices of corn, soybeans, and wheat, by forecast attempt and for two forecasting approaches; quarterly, 1966-73

Commodity	Forecast approach	Forecast attempt			
		1	2	3	4
		Percent			
Corn	Futures	15.66	12.89	8.10	3.09
	ERS	13.67	13.01	10.02	5.06
Soybeans	Futures	13.45	11.37	8.49	3.79
	ERS	14.93	12.39	9.26	4.74
Wheat	Futures	14.98	12.46	8.94	5.47
	ERS	16.15	13.17	10.24	5.72

Table 3 --Theil-U statistics by forecast attempt and for two forecasting approaches for farm prices of corn, soybeans, and wheat, 1966-73

Commodity	Forecast approach	Forecast attempt			
		1	2	3	4
Corn.	Futures	0.967	0.858	0.562	0.165
	ERS	1.005	.956	.749	.378
Soybeans.	Futures	1.022	.930	.723	.360
	ERS	1.064	.997	.777	.392
Wheat	Futures	.937	.890	.797	.403
	ERS	1.109	1.068	.883	.422

substantial proportion of its forecasts between any two attempts, particularly between first and second attempts, a large proportion of the revision ratios are zero. Because of the borderline nature of a zero revision ratio, the distributions for ERS could be substantially altered by only a minute change in the category bounds. That is, dropping the lower bounds of the (.01-.99) and (.01-1.99) intervals to include zero would strongly shift the relative distributions of revision ratios such that this measure would favor ERS. Of course, there is no obvious reason why one would desire to classify all constant forecasts as being successful revisions. On the other hand, if an initial forecast is perfect or close to being so, not deviating from it would be an optimum course. Because of this complication, the most meaningful ratio is perhaps the overall one, such as R 1.4, between a first and a fourth forecast.

An interesting series of ratios is associated with ERS' forecasts of wheat prices. Between any two forecast attempts, at least 20 percent of the forecasted prices were unchanged. Yet none of the initially forecasted prices were maintained throughout the subsequent three forecast attempts. As presented in table 4, the percentages for R 1.4 slightly favor the futures method for corn and soybeans, but in the case of wheat, ERS is substantially better. Alteration of the lower bound would cause the two marginal cases to shift in favor of ERS. It is interesting to note that the two subclasses of the successful revision interval show both approaches to be dominated by cautious revisions. The only exceptions are the revisions for R 3.4 and R 1.4 on wheat futures. For these, the successful revisions are about equally divided between being too small and too large. The revision ratios and their distributions provide interesting insights for forecast evaluation. However, for the current comparative analysis, revision ratios do not indicate a generally preferred approach between these two alternatives.

For the 8 years examined, 1973 was subject to the largest price movements. Neither ERS nor the futures approach to forecasting used here did well in forecasting these 1973 prices when viewed in terms of the average forecast errors (table 5).

Considering the forecast for soybeans, the average absolute percentage errors during 1973 for both approaches were close. As a consequence, the relative errors of the two approaches over the observed years were not substantially altered by the inclusion or exclusion of 1973. However, for both corn and wheat prices, the futures approach generally outperformed ERS during 1973. Consequently, calculated relative performance measures for the two approaches were strongly influenced by the inclusion of 1973 data in the historical record. In the case of wheat, ERS has smaller average percentage errors in three of the four attempts over the 1966-72 interval. Recall from table 2 that for the overall period the futures approach had smaller averages for all four attempts. The evidence presented in table 5 places the results and conclusions from table 2 in a considerably different perspective. The new breakdown is informative but less suggestive as to which approach provides better forecasts.

The Theil-U statistics presented in table 3 for the overall period are altered substantially by the removal of the 1973 observations. In fact, the

Table 4 --Distribution of revision ratios between selected forecast attempts for two forecasting approaches of farm prices for corn, soybeans, and wheat, 1966-73

Revision ratios ^{1/} :		Percentage of R statistics					
by commodity	:	.01-:	.01-:	1.00- :	:	Under :	Over
and approach	:	1.99 :	.99 :	1.99 :	0.00 :	0.00 :	1.99
:							
R1.2							
Corn	Futures	:61.29	54.84	6.45	0.0	32.26	6.45
	ERS	:40.00	36.00	4.00	24.0	28.00	8.0
Soybeans	Futures	:71.88	65.63	6.25	0.0	21.88	6.25
	ERS	:64.00	60.00	4.00	20.0	8.0	8.0
Wheat	Futures	:59.38	53.13	6.25	0.0	31.25	9.38
	ERS	:48.00	48.00	0.0	40.0	8.0	4.0
:							
R2.3							
Corn	Futures	:68.75	50.0	18.75	0.0	28.13	3.13
	ERS	:71.88	56.25	15.63	9.38	18.75	0.0
Soybeans	Futures	:75.0	53.13	21.88	3.13	12.5	9.38
	ERS	:62.5	50.0	12.5	12.5	15.63	9.38
Wheat	Futures	:75.0	46.88	28.13	0.00	21.88	3.13
	ERS	:62.5	34.38	28.13	28.13	6.25	3.13
:							
R3.4							
Corn	Futures	:68.75	34.38	34.38	6.25	15.63	9.38
	ERS	:81.25	71.88	9.38	6.25	9.38	3.13
Soybeans	Futures	:81.25	46.88	34.38	0.0	3.13	15.63
	ERS	:71.88	65.63	6.25	9.38	9.38	9.38
Wheat	Futures	:56.25	28.13	28.13	0.0	34.38	9.38
	ERS	:62.50	37.5	25.0	21.88	15.63	0.0
:							
R1.4							
Corn	Futures	:87.1	58.06	29.03	0.0	9.68	3.23
	ERS	:84.0	56.0	28.0	4.0	8.0	4.0
Soybeans	Futures	:90.63	56.25	34.38	0.0	0.0	9.38
	ERS	:88.0	76.0	12.0	8.0	0.0	4.0
Wheat	Futures	:81.25	40.63	40.63	0.0	12.5	6.25
	ERS	:96.0	68.0	28.0	0.0	0.0	4.0
:							
:							

^{1/} See appendix D for description and explanation of R, or see H. Theil, Economic Forecasts and Policy, (North-Holland, Amsterdam, 2nd ed. 1961), p. 62.

Table 5--Average absolute percentage forecast errors in farm prices of corn, soybeans, and wheat, over selected quarters by quarterly forecast attempt for two forecasting approaches

Commodity	: Quarters : : included :	Forecast : : approach :	Forecast attempt			
			1st	: 2nd	: 3rd	: 4th
Corn	:	:				
	: 1966-72	Futures	13.39	10.71	6.88	2.91
	:	ERS	9.72	9.78	7.37	3.77
	: 1973	Futures	30.98	28.15	16.66	4.34
Soybeans	:	ERS	42.62	35.61	28.55	14.10
	:	:				
	: 1966-72	Futures	8.36	6.85	4.87	1.97
	:	ERS	9.45	7.23	5.86	3.24
Wheat	: 1973	Futures	49.07	43.03	33.80	16.50
	:	ERS	55.07	48.55	33.06	15.26
	:	:				
	: 1966-72	Futures	10.93	9.22	6.58	3.98
	:	ERS	10.67	8.18	6.33	4.36
	: 1973	Futures	43.32	35.11	25.44	15.90
	:	ERS	56.33	48.13	37.67	15.28
	:	:				

Table 6--Theil-U statistics for 1966-72 by forecast attempt and for two forecasting approaches for farm prices of corn, soybeans, and wheat

Commodity	: Forecast : : approach :	Forecast attempt			
		1st	: 2nd	: 3rd	: 4th
Corn	:	:			
	: Futures	1.041	0.856	0.562	0.271
	: ERS	.763	.740	.540	.270
	:	:			
Soybeans	: Futures	.868	.693	.533	.300
	: ERS	.866	.707	.647	.381
Wheat	:	:			
	: Futures	.974	.884	.758	.314
	: ERS	.951	.898	.859	.542
	:	:			

statistics presented in the table are so heavily dominated by what occurred in 1973 that the Theil-U values computed for 1966-73 are roughly the same as those which could be computed for 1973 only. For instance, the Theil-U values for soybean prices shown in table 3 are 1.064, 0.997, 0.777, and 0.392; the corresponding ones for 1973 are 1.072, 1.009, 0.783, and 0.392. The Theil-U statistics, after removal of the 1973 observations, are reported in table 6. The greatest impact of excluding the 1973 observations is on the performance measures for ERS forecasts of corn prices, but for soybean prices, there is a general improvement shown for both approaches. However, the impacts on the Theil-U values computed for wheat are less easily characterized. Once again, the results and conclusions from the earlier table are substantially nullified by the removal of 1973 data. Note that the naive extrapolator associated with a Theil-U value of unity would have committed average absolute percentage forecast errors of 12.53, 8.78, and 10.10 for corn, soybeans, and wheat, respectively, for 1966-72.

Some impacts are carried over to the distributions of revision ratios. However, the general magnitudes and relative positions are not substantially altered from those found in table 4.

Forecast bias.--In analyzing the forecast records, one question that arises is whether or not a systematic pattern of bias can be detected. Naturally, if any such pattern could be isolated, the users of the forecast could quickly incorporate this information. An analysis of the forecasting records shows that the ERS forecasts include a higher proportion of underestimates than found in the comparable forecasts using futures. Of 12 available comparisons, the only exception is the first forecast of soybean prices. If one examines the 7 years prior to 1973, the overall proportion of underestimates is 50 percent for futures and almost 57 percent for ERS. This aggregation is across the three commodities as well as across the four forecast attempts.

Over these 7 years, patterns of bias appear to emerge. In forecast attempts for both corn and soybeans, ERS consistently made more and larger underestimates than the futures method. The futures method, on the other hand, produced more and larger overestimates. Therefore, the net effect was negative average errors by ERS and positive average errors for futures forecasts in the case of corn. For soybeans, both methods of forecasting yielded negative average errors, but these ran several percentage points larger for ERS. These comments are illustrated in table 7 by aggregating across the four forecast attempts for first quarter 1966 through fourth quarter 1972 and computing the weighted average percentage errors.

These results suggest that some direct combination of the two forecasting methods could have been more desirable than either one was separately. A direct comparison of individual forecasts showed that the two methods typically err in the same direction and often within several percentage points of each other. For both the first and second forecasts over the 8 years and across the three commodities, nearly 15 percent of the corresponding errors were of opposite sign. This percentage rose to nearly 20 for third forecasts and doubled to just over forty for fourth forecasts. The upshot is that the average absolute error associated with a mean of the two forecasts is always

Table 7--Comparative forecast bias between ERS and futures forecasts

Commodity and forecast method	: Average : under- : estimate	: Average : over- : estimate	: Actual : average	: Absolute : average
	<u>Percent</u>			
Corn:	:			
ERS	: -8.16	7.72	-1.88	7.66
Futures	: -6.24	10.37	2.86	8.41
	:			
Soybeans:	:			
ERS	: -8.64	2.88	-4.26	6.44
Futures	: -7.19	3.78	-1.80	5.52
	:			
Wheat:	:			
ERS	: -8.43	5.81	-3.28	7.38
Futures	: -8.30	6.86	-1.80	7.68
	:			
	:			

lower than a simple average of their respective average absolute errors and is, in fact, often lower than both of them. Take for instance the case of wheat over the 8-year period. A forecasting procedure using the mean of two forecasts would have given average absolute percentage errors of 14.17, 11.90, 9.08, and 3.55, respectively, for the four forecast periods. In comparing these with the final two rows of table 2, one can see that with a single minor exception the above numbers are lower than those from either method separately.

Conclusions.--Tentatively, based on the above results, it would appear that the ERS commodity experts could make somewhat greater use of the futures market in their forecasting. However, additional analysis of the relationships between futures prices and farm prices is undoubtedly required to make effective use of futures. No doubt there is a flow of information of various forms between ERS personnel and what occurs in the futures market, but it is difficult to assess the extent and impact of this interchange. A crucial issue, therefore, is whether either or both forecasts would suffer a diminution in performance if ERS placed greater reliance upon futures market quotations. (Currently, for example, these quotations generally influence ERS analysts' subjective appraisals during forecasting.) However, this study suggests that at least additional investigation is warranted and perhaps that the role of futures quotations in forecasting work should command greater attention.

Perhaps it is surprising as well as reassuring to find ERS doing about as well as the futures market in the shortrun forecasting activity. But it may be possible to construct a substantially better forecasting technique based on futures quotations than the one used here. The potential appears worth exploring.

Semiannual Livestock Model vs. ERS Forecasts 27/, 28/

The principal aim of this section is to illustrate, through empirical examples, the use of various nonparametric techniques in determining the relative merits of two alternative forecasting procedures for beef and pork. Comparison of the two methods focuses on forecasting performance with respect to turning point prediction, forecast revision, and overall prediction accuracy. To evaluate performance, seven forecasts made during November 1970-October 1973 were used. 29/ Two forecasts, an initial and revised prediction, were obtained for each semiannual period within this time interval.

27/ Material presented in this section was prepared by Fred Linse, mathematical statistician, NEAD, ERS.

28/ The Semiannual Livestock Model used is in a developmental stage. Forecasts for output, consumption, farm prices, and retail prices of beef and pork are generated by the model. A capsule version of the model is given in app. C.

29/ Forecast dates used in the analysis correspond to release dates of the Quarterly Situation and Outlook Memorandum.

Forecast evaluation procedure.--One approach often used in assessing predictive ability of forecasting processes is turning-point analysis. One reason for this approach is that, given the large amount of positive autocorrelation in most time series data for economic variables, it is frequently much simpler to forecast a continuation of trends than to predict the end of such movements. Four results are possible with respect to forecasts of turning points, two of which are correct and two incorrect. That is, given the occurrence of a turning point, it can be predicted (correct) or not predicted (incorrect). Conversely, if a turning point does not occur, one may be predicted (incorrect) or not predicted (correct). One difficulty encountered in evaluating turning-point forecasting performance is the determination of whether a "significant" turning point has been predicted, or if a "significant" prediction error has occurred. Actual and predicted turning points are sometimes represented by sharp rises or declines. However, relatively small turning-point changes are also possible. Small turning points indicated by actual or reported data may well be questioned on the basis of possible measurement error associated with data collection. Similarly, some turning-point prediction errors may be less than others because of the inherent random error associated with most predictive mechanisms.

One simple criterion which may be appropriate to use in appraising the significance of turning points is the mean absolute actual change in the item being forecasted. Comparing a predicted or actual turning-point change to the mean would provide an indication of whether it is above or below the average change. The relative importance of these correct predictions, or prediction errors, may then be evaluated by contrasting the specific actual turning-point change with the mean actual change for the particular item being forecasted. In the case of erroneously predicted turning points, the predicted change would be compared with the mean actual change. In this manner, some value-weighting scheme might be applied to the turning-point predictions to aid in assessing forecasting performance.

Another approach to assessing forecasting performance is to measure the ability of a given prediction device to successfully revise forecasts as the forecasted time period draws nearer to completion. A summary measure of this performance is the revision ratio developed by Theil and used in a number of recent studies on forecast evaluation. 30/

Measures of overall forecast accuracy include such summary statistics as the mean and variance of the absolute forecast error. These items emphasize average performance more than specific features of the forecasting process.

Empirical results of comparative analysis.--A brief discussion of the livestock model and the forecast derivation procedures used in the analysis is given prior to presentation of the empirical results.

30/ For a discussion of the revision ratio, see app. D, or Henri Theil, *Economic Forecasts and Policy*, N. Holland Pub. Co., Amsterdam, 2nd ed., 1961, p. 62.

The livestock model is comprised of 10 behavioral relationships and 3 identities with 13 endogenous and 23 exogenous variables specified. Production, consumption, farm prices, and retail prices for beef and pork are the principal items forecasted. ^{31/} In the current analysis, forecast performance of farm prices and production are chosen for consideration.

To reproduce forecasts based on the livestock model, predictions are required for 15 exogenous variables at each of the 7 forecast dates. ^{32/} A variety of methods utilized to obtain this information include situation and outlook memorandum forecasts, econometric relationships (if available to forecasters at the dates of forecast), seasonal adjustments, and trend extrapolation. Situation and outlook memorandum forecasts furnish the basic predictions for feed grain prices, broiler and turkey consumption, disposable personal income, and the consumer price index. On numerous occasions, these published forecast data do not meet the prediction requirements of the model. In these instances, the cited exogenous variable forecasts are derived through a combination of quarterly memo forecasts and the predictive procedures listed above. Econometric relationships are used to predict beef cow inventories. Forecasts for the remaining exogenous variables are based on simple trend extrapolation with seasonal adjustments. In some cases, actual values are used in lieu of forecasts. However, those exogenous variables which appear most likely to have the greatest influence on the model solutions are forecasted in all cases. The resulting forecasts are given in table 8.

Predictions for production and farm prices, using the exogenous variable forecasts, are presented in table 9. Note that forecasts are made for two time periods at each forecast date. In each case, forecasts are made for the half year during which the forecast date occurs and the half year ahead. The values shown in table 9 are predicted and actual percentage changes from year-ago levels. The mean and variance of the absolute percentage forecast errors and the ratio of underpredictions to overpredictions are summarized at the bottom of the table, directly below the predicted changes.

In general, based on the mean absolute percentage errors, ERS forecasts from the quarterly memo are more accurate than those of the model. The relative differences in the statistic are especially pronounced in the beef sector. For the most part, ratios of underpredictions to overpredictions are comparable between the two forecasting methods. Forecasts of beef production tend to be equally apportioned between underpredictions and overpredictions with both models. Systematic bias toward underprediction is noted in ERS forecasts for the remaining items. The model similarly tends to underpredict pork items. But contrary to ERS forecasts, the model forecasts for farm price of beef are more often overpredictions than underpredictions.

^{31/} See app. C for a brief technical presentation of the semiannual model for beef and pork.

^{32/} Forecasts were not prepared for eight exogenous variables. These variables have either essentially deterministic outcomes (seasonal, trend, and population), forecasts directly tied to other exogenous predictions, or length of lags exceeding the forecasted periods.

Table 8--Exogenous variable forecasts for second quarter 1970 through second quarter 1974^{1/}

Forecast date	Forecasted period ^{2/}	BCI	CPI	PC	NIBF	NIPK	GPBF	GPPK	MPBF	MPPK	PPI	WMP	P/L-1	PSM	CBR	CTK
November 4, 1970	1970-II	:36,860	137.9	2.19	850.00	110.0	45.0	30.0	240.0	130.0	0.7165	4.01	7.21	4.00	3,753.9	1,112.8
	1971-I	:37,030	140.85	2.26	800.00	170.0	55.0	50.0	230.0	140.0	.6955	4.16	7.35	4.00	3,764.6	420.0
May ³ , 1971	1971-I	:37,877	141.2	2.54	800.00	125.0	54.0	100.0	240.0	125.0	.7204	4.18	7.29	4.04	3,672.9	452.3
	1971-II	:38,742	143.5	2.43	900.0	120.0	50.0	90.0	195.0	85.0	.7445	4.30	7.35	3.99	3,695.2	1,210.0
November 16, 1971	1971-II	:38,742	144.2	1.69	800.0	120.0	40.0	110.0	180.0	85.0	.7556	4.27	7.33	4.02	3,836.5	1,222.1
	1972-I	:39,607	145.5	1.83	750.0	100.0	30.0	100.0	170.0	95.0	.7845	4.42	7.30	3.94	3,885.5	452.3
May 10, 1972	1972-I	:38,807	145.7	1.97	950.0	170.0	50.0	105.0	180.0	95.0	.77585	4.32	7.30	3.94	3,937.5	478.3
	1972-II	:39,723	148.3	2.00	1,000.0	115.0	50.0	110.0	160.0	50.0	.8150	4.45	7.33	3.89	4,000.0	1,285.5
November 3, 1972	1972-II	:39,723	148.0	2.02	1,000.0	115.0	60.0	55.0	160.0	50.0	.80685	4.55	7.33	4.16	4,006.0	1,242.4
	1973-I	:40,637	150.8	2.08	825.0	160.0	10.0	40.0	170.0	60.0	.8500	4.65	7.29	4.86	4,193.1	501.2
June 1, 1973	1973-I	:41,102	used	2.59	850.0	150.0	10.0	35.0	150.0	60.0	.86095	4.71	use	6.50	3,982.4	496.2
	1973-II	:42,300	actual	3.57	1,100.0	150.0	5.0	15.0	160.0	62.0	.8970	4.84	actual	7.30	3,906.4	1,279.0
October 25, 1973	1973-II	:42,300	used	4.02	1,100.0	50.0	5.0	15.0	160.0	62.0	.9005	4.84	7.16	11.94	4,011.2	1,266.2
	1974-I	:43,499	153.8	3.84	850.0	50.0	10.0	35.0	150.0	60.0	.932	4.97	7.33	8.39	4,034.4	518.2
February 13, 1974	1974-I	:42,874	153.8	4.19	850.0	50.0	10.0	35.0	150.0	60.0	.940	4.97	7.30	8.39	4,037.0	520.0
	1974-II	:44,200	155.0	3.69	1,100.0	50.0	5.0	15.0	160.0	62.0	.960	5.12	7.20	6.90	4,050.0	1,300.0

1/ Exogenous variables are as follows: BCI--Beef cow inventory (million head); CPI--Consumer price index less food; PC--Price received by farmers for corn (cents/pound); NIBF--Net imports of beef (million pounds); NIPK--Net imports of pork (million pounds); GPBF--Government purchases of beef (million pounds); GPPK--Government purchases of pork (million pounds); MPBF--Military purchases of beef (million pounds); MPPK--Military purchases of pork (million pounds); DPI--Disposable personal income (trillion dollars); WMP--Wages of meatpackers (dollars/hour); P/L-1--Number of pigs saved per litter, t-1; PSM--Price of soybean meal (cents/pound); CBR--Consumption of broilers (million pounds); CTK--Consumption of turkeys (million pounds).

2/ Roman numerals distinguish between the first and second halves of a given year (first half-I and second half-II).

Table 9--ERS and semiannual livestock model forecasts^{1/}

Forecast date	Forecasted period 2/	Beef production		Pork production		Farm price of beef		Farm price of pork	
		Forecast ERS : model	Actual	Forecast ERS : model	Actual	Forecast ERS : model	Actual	Forecast ERS : model	Actual
	1969-II 1970-I		+2.4 +4.3		-4.1 -4.5		+4.8 -1.7		+34.9 +17.8
November 4, 1970	1970-II 1971-I	+2.5 +1.35	+1.0 +1.3	+14.0 +9.1	+11.7 +18.9	-1.4 +2.3	+21.9 -18.3	-26.5 -21.6	-1 -36.0
May 3, 1971	1971-I 1971-II	+7.75 +3.5	+1.3 +1.0	+19.9 -1.1	+18.9 +2.7	+4.0 +4.0	+17.9 +15.3	-30.0 0.0	-19.5 +1.0
November 16, 1971	1971-II 1972-I	+1.0 +3.0	+1.0 +1.8	+2.3 -8.0	+2.7 -6.5	+13.5 +1.4	+17.3 +8.3	0.0 +23.0	-4.6 +48.2
May 10, 1972	1972-I 1972-II	+3.0 +4.9	+1.8 +3.0	-3.25 -6.5	-6.5 -9.4	+9.5 -1.85	-10.5 +23.9	+40.0 +22.0	+20.9 +36.0
November 3, 1972	1972-II 1973-I	+1.1 +3.0	+3.0 -4.6	-8.1 +1.0	-9.4 0.0	+7.6 +3.2	+12.6 +4	+40.7 +2.7	+39.2 +8.0
June 1, 1973	1973-I 1973-II	-5.2 -1.0	-4.6 -6.0	-6.5 +7	0.0 -6.6	+24.0 +37.5	+34.6 +37.4	+45.5 +68.0	+45.0 +24.2
October 25, 1974	1973-II 1974-I	-5.7 +3.6	-6.0	-5.8 -3.5	-6.6	+20.0 -2.5	+48.1 +15.0	+54.2 +10.7	+47.9 +9.6
February 3, 1974	1974-I 1974-II	+1.0 +6.3	-3.5 +3.6	-3.5 +6.9	+4.1 -2.5	+9.2 +2.6		-15.0 -8.4	+13.9 -14.5
Mean absolute percentage error		1.8		3.22		6.42	14.10	9.52	13.13
Standard deviation of absolute percentage error				2.9		6.2	9.2	12.7	11.9
Ratio of under to over forecasts		6/6		9/4		12/1	5/8	11/2	10/2

^{1/} Forecasts and actual values are entered as percentage changes from year-ago levels. ^{2/} Roman numerals distinguish between the first and second halves of a given year (first half-I and second half-II).

Tables 10-13 summarize forecast performance of the model and quarterly memo forecasts with respect to turning points. The body of each table shows the number of actual and predicted turning points and is divided into two parts. The first part shows the initial forecast results and the second part shows the revised forecast results. Each of these parts is arranged to show the four possible turning-point outcomes (discussed earlier) for both the ERS and model forecasts.

In the current problem, the number of actual turning points observed over the sample period was relatively small (one for each beef and pork item for which initial and revised forecasts are possible, plus a single turning point in the pork items for which only a revised forecast could be prepared). Although such a small number of turning points is inadequate for a practical evaluation, the analysis is useful for its major purpose here, which is to provide an illustrative example of comparative turning-point analysis.

Table 10 shows that although the initial forecast of the beef production turning point is unsuccessful for both ERS and the model, the revised forecasts are successful. However, in the revised forecast by the model, two erroneous predictions of turning points are generated--one of which is greater than the mean absolute actual percentage change for beef production over the sample period.

Turning-point forecasting performance for the farm price of beef is illustrated in table 11. Note that ERS successfully forecasted the single actual turning point of the farm price of beef on the initial attempt, but the model did not. Revised forecasts of the farm price of beef are similar to the initial forecasts, although the model's revisions include two erroneous turning-point predictions.

The turning-point forecast analysis for pork production is given in table 12. Both ERS and the model successfully predicted the single actual turning point observed for initial forecasts. However, several erroneous turning points were initially forecast by both the model and ERS. With respect to revised forecasts, the model and ERS were successful in predicting both observed turning points; no turning-point forecast errors were committed by either method.

Table 13 offers evidence that the model performs somewhat better than ERS for initial forecasts of the farm price of pork. However, in the case of revised forecasts, both ERS and the model predicted one out of the two actual turning points. The model forecasted the only erroneous turning point observed in the initial and revised predictions.

In summary, ERS and the model performance were about equal in predicting turning points. However, erroneous turning points are most often predicted by the model. These errors are particularly noticeable for revised forecasts of the beef sector and for initial forecasts of pork production. The severity of the errors is noted by the presence of predicted changes which are in excess of the mean absolute actual percentage change for these items.

Table 10--Turning-point forecasting performance of beef production

Actual	Predicted			
	Turning point		No turning point	
	ERS	Model	ERS	Model
	<u>Initial forecast ^{1/}</u>			
Turning point.	0	0	1*	1*
No turning point . . .	0	1	5	4
	<u>Revised forecast ^{1/}</u>			
Turning point.	1*	1*	0	0
No turning point . . .	0	2(1*)	6	4

^{1/} Asterisks indicate the percentage change of the turning point (whether actual or predicted) is greater than the mean absolute actual percentage change of the forecasted item.

Table 11--Turning-point forecasting performance of farm price of beef

Actual	Predicted			
	Turning point		No turning point	
	ERS	Model	ERS	Model
	<u>Initial forecast ^{1/}</u>			
Turning point.	1	0	0	1*
No turning point . . .	0	0	5	5
	<u>Revised forecast</u>			
Turning point.	1	0	0	0
No turning point . . .	0	2	6	5

^{1/} Asterisks indicate the percentage change of the turning point (whether actual or predicted) is greater than the mean absolute actual percentage change of the forecasted item.

Table 12--Turning-point forecasting performance of pork production

Actual	Predicted			
	Turning point		No turning point	
	ERS	Model	ERS	Model
	<u>Initial forecast^{1/}</u>			
Turning point. . . .	1	1	0	0
No turning point . .	3	2(1*)	2	3
	<u>Revised forecast^{1/}</u>			
Turning point . . .	2(1*)	2(1*)	0	0
No turning point . .	0	0	5	5

^{1/} Asterisks indicate the percentage change of the turning point (whether actual or predicted) is greater than the mean absolute actual percentage change of the forecasted item.

Table 13--Turning-point forecasting performance of farm price of pork

Actual	Predicted			
	Turning point		No turning point	
	ERS	Model	ERS	Model
	<u>Initial forecast</u>			
Turning point. . . .	0	1	1	0
No turning point . .	0	0	5	5
	<u>Revised forecast^{1/}</u>			
Turning point . . .	1*	1*	1	1
No turning point . .	0	1	5	4

^{1/} Asterisks indicate the percentage change of the turning point (whether actual or predicted) is greater than the mean absolute actual percentage change of the forecasted item.

Tables 14 and 15 present the results of the revision ratio analysis. The distribution of R values, classified according to absolute percentage change in the actual values, allows a more detailed perspective of potential bias in each forecasting method as well as performance differences between the alternative forecasting techniques.

Comparison of the model and ERS forecast revisions for beef production indicates that the procedures yield nearly identical results. In both instances, five out of the six revisions are successful ($0.00 < R < 2.00$). Because of the relatively small percentage change characteristic of beef production, the bulk of the R-ratios are contained within the less-than-5-percent-change category. Consequently, in order to obtain a more appropriate ranking of forecast revision errors or successes according to their relative importance, categories with much smaller percentage change limits would have to be defined. In general, it appears more appropriate to rank revision errors or successes against standards determined by the variation specific to each item. The present approach to revision ratio analysis applies a standard classification to all items forecasted for purposes of illustration.

A comparison of forecast revisions for the alternative methods in relation to the farm price of beef showed the model forecasts to be somewhat inferior to the ERS quarterly memo forecasts. For the price of beef at the farm level, the model produced three unsuccessful forecast revisions which were in the wrong direction ($R < 0$). These revision errors occurred most often in conjunction with large changes in the actual magnitudes. Such a result is cause for concern since, even though one would expect some unsuccessful revisions, hopefully they would occur in conjunction with the smaller percentage changes in actual values. All ERS forecast revisions were successful.

In comparing forecast revisions for pork production (table 15) it is apparent that ERS methods produced a greater number of successful revisions than did the model. The revision errors committed by the model were primarily revisions in the wrong directions ($R < 0$).

Forecast revision errors with respect to the farm price of pork were most serious in the model's predictions. The nature of these errors were such that the revised forecasts were farther away from the actual value than the initial forecast. The most critical errors are noted by their conjunctive occurrence with large actual changes in the pork farm price. As with the farm price of beef, all of the ERS forecast revisions were successful.

From an overall standpoint, the forecast revisions made by ERS were more frequently successful than those of the livestock model. Although ERS procedures did render unsuccessful forecast revisions, all errors were made in conjunction with the occurrence of small actual changes in the forecasted items. The smaller variation in the production items requires a finer classification of actual percentage change to assess more fully the importance of revision errors. The revision errors in model forecasts were more serious when gauged by the actual percentage-change standard. ERS farm price forecast revisions in both the beef and pork sector tended to underestimate the actual changes required to produce perfect revisions. This conservative trend is not

Table 14--Frequency distributions of revision ratios for beef forecasts

Percentage range of actual change	Range of R:	R < 0.00	0.00 ≤ R < 1.00	1.00 ≤ R < 2.00	R > 2.00	Total
Model:						
Beef production ΔA < 5%		1	1	3		5
5% ≤ ΔA < 15%				1		1
15% ≤ ΔA						
Beef farm price ΔA < 5%						
5% ≤ ΔA < 15%		1	1	1		4
15% ≤ ΔA		1		1		2
ERS:						
Beef production ΔA < 5%			1	3	1	5
5% ≤ ΔA < 15%			1			1
15% ≤ ΔA						
Beef farm price ΔA < 5%						
5% ≤ ΔA < 15%			4			4
15% ≤ ΔA			1	1		2

Table 15--Frequency distributions of revision ratios for pork forecasts

Percentage range of actual change	Range of R	R < 0.00	0.00 ≤ R < 1.00	1.00 < R < 2.00	R > 2.00	Total
Model:						
Pork production ΔA < 5%		1			1	2
5% ≤ ΔA < 15%		1	2			3
15% ≤ ΔA			1			1
Pork farm price ΔA < 5%					1	1
5% ≤ ΔA < 15%						
15% ≤ ΔA			3		2	5
ERS:						
Pork production ΔA < 5%			1		1	2
5% ≤ ΔA < 15%			2	1		3
15% ≤ ΔA				1		1
Pork farm price ΔA < 5%						
5% ≤ ΔA < 15%			1			1
15% ≤ ΔA			4	1		5

overly apparent in production forecasts or in model revisions for either item forecasted.

Conclusions.--The foregoing analysis, which is presented primarily for the purpose of illustrating the use of various nonparametric techniques in evaluating competing forecasting procedures, indicates that the ERS consensus forecasts are somewhat better than the unadjusted forecasts of the semiannual livestock model used here. Judgmental adjustment of model forecasts, which is undoubtedly a more common and reasonable procedure when formal models are used in forecasting, could well lead to improved model forecasts. In addition, the use of such formal frameworks could provide an improved basis for evaluating and systematically improving the overall performance of the ERS forecasting program. Specifically, model analysis could be used to diagnose forecasting problems as well as offer some aid in prescribing remedies.

Determining Sources of Forecast Error

The Beef-Pork Sector

This section demonstrates the use of a semiannual livestock model described briefly in appendix C for identifying and measuring sources of error in the November 3, 1972 forecast for the first half of 1973. Prediction errors associated with farm price and production forecasts for the beef-pork sector are evaluated.

In earlier sections of this report, it was pointed out that a forecast consists of two parts--observations and a procedure. Frequently, the observations used in producing a forecast also have an inherent degree of uncertainty associated with them. Hence, some portion of the overall forecast error can possibly be attributed to both observational and procedural deficiencies.

To illustrate the isolation and measurement of sources of forecast error, this approach uses the livestock model to represent the procedural portion of the forecast process. The observations or input information is provided by the set of exogenous variable forecasts outlined in the previous section of this report and summarized in table 8.

Impact multipliers are used to identify and measure prediction errors originating with the exogenous variable forecasts. ^{33/} Impact multipliers in this example can be thought of as approximations to reduced-form parameters. That is, they are an approximate measure of the impact each exogenous variable exerts on a given endogenous variable, all other exogenous variables held constant. The multipliers are determined by finding the difference between equilibrium solutions corresponding to two different levels of a particular

^{33/} For a further explanation of impact multipliers, see Henri Theil and J. C. G. Booth, "The Final Form of Econometric Equation Systems." Rev. of the Int. Stat. Inst., Vol. 30, 1962, pp. 136-152.

exogenous variable. ^{34/} Numerical values for the multipliers are then imputed from these results.

With regard to the current problem, impact multipliers are used to estimate the influence of exogenous variable forecast errors on the predictions for such endogenous variables as farm prices for beef and pork. The two equilibrium solutions required for each exogenous variable are derived from the November 3, 1972 forecast for the first half of 1973 and the actual value as reported for the first half of 1973.

Table 16 presents the overall model results for the various endogenous variables forecasted. The two model solutions are based on exogenous variable data provided by the November 1972 forecast and the reported actual value for the first half of 1973. While large errors are observed in the model's November forecast for the first half of 1973, the results obtained using the reported actual values demonstrate a much closer correspondence with the reported actual values of production and farm prices. The difference between these two solutions represents an estimate of the total forecast error contributed by inaccurate predictions of the exogenous variables.

Table 17 summarizes the impact of forecast errors in the exogenous variables on production and farm price predictions for the first half of 1973. The price of corn (PC), commercial consumption of broilers (CBR), and the number of sows lagged one period (NSWF-1) are the largest contributors to errors in the November 1972 forecast of production and farm prices. Specifically, the larger error in the corn price forecast is the principal cause of the overprediction of beef production. This error is transmitted to farm prices of beef and pork. The forecast error in broiler consumption enters the model through the demand relationships. The resulting error in farm price forecasts induces the observed error in the beef production forecast. Pork production, as it is presently specified, is relatively insensitive to current input and output prices. A sizable error in the forecast for the number of sows farrowing, lagged one period, is primarily responsible for the overprediction of pork production, which causes the farm price to be understated.

In summary, prediction errors with respect to the corn price and the commercial consumption of broilers in the first half of 1973 and the number of sows farrowing in the second half of 1972 are the major sources of forecast errors for the endogenous variables forecasted. As indicated in table 15, model results for the first half of 1973, using the reported exogenous values, constitute a significant improvement over model forecasts based on the November 1972 predictions for the exogenous variables. Thus, a more accurate forecast could have been obtained if smaller prediction errors had occurred in key exogenous variables, particularly for feed input costs.

^{34/} The Gauss-Seidel iterative technique was utilized to solve the model for equilibrium values. A discussion of this technique is given in Dale Heien, J. L. Matthews, and Abner Womack, "A Methods Note on the Gauss Seidel Algorithm for Solving Econometric Models." Agr. Econ. Vol. 25, No. 3, July 1973, pp. 71-80.

Table 16--Model forecasts and estimates of selected endogenous variables
for the first half of 1973

Variable	: Model forecast : based on Nov. 1972 : exogenous predictions	: Model estimate : based on reported : data for the : exogenous variables	: Reported values : for the : endogenous variables
Beef:	:	:	:
Production	: 11,838.20	10,526.10	10,500.00
Farm price	: 33.40	44.62	41.73
Pork:	:	:	:
Production	: 7,091.30	6,583.50	6,524.00
Farm price	: 26.82	36.70	35.17

Table 17 --Relative forecast error contributions to the livestock model forecast for the first half of 1973, based on the November 3, 1972, forecast.^{1/}

Exogenous variable ^{2/}	Forecasted	Reported	Endogenous variable forecast errors			
	value	value	Beef	Beef	Pork	Pork
	(Nov. 3, 1972)	(July 1, 1973)	Production:	farm	Production:	farm
			price	price	price	price
			Million	Dollars	Million	Dollars
			pounds	per/cwt	pounds	per/cwt
PC	2.08	2.715	336.9	-1.87	21.1	-0.70
PC1	2.02	2.27	181.1	-.97	-2.3	-.23
NIFB	824.0	803.0	13.5	-.16	-.5	-.05
GPBF	10.0	9.6	-.2	0.0	0.0	0.0
GPPK	40.0	39.3	-.3	0.0	.1	0.0
PSM	4.86	10.12	16.4	-.19	40.2	-.44
WMP	4.65	4.62	-42.0	.50	1.7	.18
CPI	150.8	150.6	5.4	-.06	-.3	-.03
DPI	.8500	.8605	108.4	-1.29	-9.4	-.97
MPBF	170.0	160.0	-6.2	.07	.2	.02
P/L-1	7.29	7.26	16.5	-.20	40.6	-.45
NIPK	160.0	82.0	32.3	-.38	-6.8	-.70
CBR	4,193.1	3,936.0	401.3	-4.79	-23.0	-2.40
CTK	501.2	513.1	-27.4	.33	2.2	.23
BCI	40.637	40.918	97.1	-.52	-1.2	-.12
BCI-1	39.772	39.862	-31.0	.16	.4	.04
NSWF-1	6.714	5.967	171.7	-2.04	422.1	-4.67

^{1/} Negative signed errors indicate underestimates and positive values indicate the opposite. Column totals do not account for the full difference between the model forecast and 1973 estimate due to rounding errors and omission of some lagged endogenous variables. (These variables perform relatively minor roles in the model and were not considered to be significant sources of error)

^{2/} Refer to app. C for variable definition and units of measurement.

The 1972/73 wheat marketing year marked the beginning of a period of extremely volatile wheat price increases, and associated difficulties in short-term forecasting of utilization and prices. Prices early in the 1972 marketing season were near the loan level as U.S. wheat production reached a new record. However, several developments in the world pushed export demand for U.S. wheat to nearly double the year before, which drew down wheat stocks and resulted in rapid price increases during the year. Forecasting domestic wheat prices and wheat utilization was extremely difficult, and some of the early season forecasts contained considerable forecast error.

The implications of such errors for ERS's short-term outlook program through subsequent impacts on food price forecasts and the direction of future forecasting activity are of major concern. The following discussion is a review of the published wheat forecasting efforts for the 1972/73 marketing year. A critique of the forecasts is made through the use of an econometric model to illustrate how possible sources of forecast error can be determined.

Published forecasts for wheat utilization are issued periodically during the marketing year by the Interagency Commodity Estimates Committee (ICEC) for wheat. The ICEC is made up of representatives of the Agricultural Stabilization and Conservation Service (ASCS), the Foreign Agricultural Service (FAS), and ERS. Committee forecasts are revised during the marketing year to include revised information on both the supply side early in the season and changes in demand factors as the season develops. Nine separate forecasts, beginning in May 1972, through April 1974, were prepared by ERS analysts for the 1972/73 marketing year (July-June).

An analysis of forecasts and forecast errors could take any one of several forms ranging in degree of formality. The review discussed here has employed an econometric demand model 36/ based on annual relationships in an attempt to quantify some of the major factors affecting price movements and forecasts during the 1972/73 marketing year. The analysis focuses on periods within the year when the ICEC published its forecasts for prices and utilization. Ex-post model forecasts of wheat exports, domestic utilization, and farm prices were generated by utilizing data for predetermined variables in the model that was available to analysts at the time they made their forecasts. These data items include, among other things, world grain production and wheat sales to the USSR. While nine forecasts were made for the 1972/73 year, only four are presented here to illustrate how some factors contributed to forecast errors. The forecast dates selected were May 1972, November 1972, May 1973, and November 1973.

35/ Material in this section was prepared by Robert G. Hoffman, agricultural economist, U.S. Dept. of Treasury, formerly agricultural economist, NEAD, ERS.

36/ The wheat model used was developed by Terry Barr NEAD, ERS and Robert G. Hoffman, U.S. Dept. of Treasury. This system was based on earlier work of several members of ERS. A model specification and variable description are shown in app. C.

In brief, the model used to illustrate the possible magnitude and sources of forecast error includes behavioral relationships for domestic food use, feed use, wheat exports, carryout stocks, and prices received by farmers for wheat. Model forecasts are generated by using estimates for the exogenous or given variables specified in the behavioral equations. Values used for the exogenous data at each of the four forecast dates are given in table 18. The factors or variables of key concern in 1972/73 include: (1) wheat supplies in major competing exporting countries, (2) grain production in the rest of the world, and (3) the sale of wheat to the USSR. Model forecasts based on the values for these factors at the various forecast dates are compared with the forecasts made by the ICEC to demonstrate the similarity of outcomes for the two alternative forecasting procedures.

The ICEC forecasts and the model estimates at the selected time points are similar if based on the information available to each at the time, although some differences occur in individual utilization items. Table 19 summarizes the forecasts for both procedures and four forecast dates. Since model forecasts based on final estimates of input data are close to the latest reported values for utilization and prices, the relationships used to describe utilization and prices were probably not a significant source of error in 1972/73. Much of the error in forecasts, consequently, was attributed to assumptions about values of data inputs to the model.

As indicated earlier, forecast errors for wheat prices and utilization in 1972/73 were apparently due to assumed values for key data series treated as given to the model. On closer examination, the major source of input data errors were for the factors used to forecast export demand for U.S. wheat. For the most part, forecasts of U.S. wheat prices and utilization were revised successfully during the year as new information became available on supplies of wheat in major exporting countries, other world production of all grains, and the additional demand for grain by the USSR over and above what would be suggested by historical relationships 37/.

Based on historic relationships, the estimated year-to-year decline in other world grain production in November 1972 suggested that U.S. wheat exports would expand by nearly 300 million bushels from the year before. 38/ Most of this increase was associated with poor grain production in the world, outside of the four major wheat-exporting countries. By May 1973, growing information about the magnitude of the decline in world grain production added nearly 75 million bushels to the model forecast, or a net year-to-year forecasted gain of nearly 400 million bushels in U.S. wheat exports. However, the actual year-to-year gain was 550 million bushels, about 150 million bushels above the level indicated by past relationships. This difference was largely accounted for by stepped-up U.S. wheat exports to the USSR.

37/ Grain production in the remainder of the world is defined here as wheat, milled rice, feed grain, and rye production in countries excluding Argentina, Australia, Canada, and the United States.

38/ Wheat exports in 1971/72 equaled 632 million bushels.

Table 18--Predetermined or given values used for wheat, annual econometric model estimates for selected forecast dates, 1972/73

Item	Units	1972		1973	
		May	November	May	November
U.S. wheat production	Mil. bu.	<u>1</u> / 1,500	<u>1</u> / 1,559	1,545	1,545
Wheat supply for major wheat exporters <u>2</u> /	Mil. bu.	<u>3</u> / 1,908	<u>3</u> / 1,659	1,734	1,700
Grain production in rest of world <u>4</u> /	Mil. m.t.	<u>3</u> / 778	<u>3</u> / 775	<u>3</u> / 758	<u>3</u> / 755
USSR additional export demand	Mil. bu.		150	150	150
Cattle on feed <u>5</u> /	Thousand	<u>3</u> / 5,900	5,887	5,887	5,887
Sorghum price (July-Sept, 1972)	Dol./cwt.	<u>3</u> / 1.85	2.05	2.05	2.05
Wheat seed use	Mil. bu.	<u>3</u> / 60	67	66	66

1/ Preliminary estimate subject to later revision. 2/ Beginning stocks and production--Argentina, Australia, and Canada. 3/ Forecasted value based on available information. 4/ Total production of wheat, milled rice, corn, oats, barley, grain sorghum, and rye, in the remainder of the world. 5/ Cattle on feed, July 1, 10 western States.

Table 19--Wheat utilization and price forecasts, based on annual econometric model and estimates of the Interagency Commodity Estimates Committee, 1972/1973

Item	May 1972		November 1972		May 1973		November 1973	
	Model estimate ^{1/}	Committee estimate ^{2/}	Model estimate ^{1/}	Committee estimate ^{2/}	Model estimate ^{1/}	Committee estimate ^{2/}	Model estimate ^{1/}	Committee estimate ^{2/}
Million bushels								
Beginning stocks..	927	927	865	865	863	863	863	863
Imports	1	1	1	1	1	1	1	1
Production	1,500	1,500	1,559	1,559	1,545	1,545	1,545	1,545
Total supply	2,428	2,428	2,425	2,425	2,409	2,409	2,409	2,409
Food use	528	NA	524	525	521	525	526	528
Seed use	258	NA	246	200	224	235	203	190
Feed	67	NA	67	67	66	66	66	67
Exports	912	NA	1,115	1,150	1,177	1,150	1,184	1,186
Total use	1,765	NA	1,802	1,942	1,988	1,976	1,979	1,970
Ending stocks	663	NA	473	483	421	433	430	438
Dollar per bushel								
Price	1.33	1.30	1.55	1.57	1.75	1.75	1.80	1.76

NA = not available.

^{1/} Model estimates of price and utilization derived from relationships in appendix C and predetermined data given in table 18 are forecasted or known.

^{2/} Committee estimates of utilization as published in Wheat Situation, Nos. 220-226. Price forecast under committee estimate from quarterly memo material.

^{3/} Latest reported from Wheat Situation, No. 229, Aug. 1974.

Table 20--Wheat model forecasts based on assumed values for selected predetermined variables, 1972/73

Item	Units	1972		1973	
		May	November	May	November
Exporters wheat supply ^{1/}					
Price	:Dol/bu.	1.69	1.86	1.80	1.82
Ending stocks	:Mil. bu.	436	405	414	409
World grain production ^{1/}					
Price	:Dol/bu.	1.56	1.56	1.78	1.82
Ending stocks	:Mil. bu.	468	468	418	409
USSR wheat exports ^{1/ 2/}					
Price	:Dol/bu.	1.46	1.82	1.82	1.82
Ending stocks	:Mil. bu.	512	409	409	409

^{1/} All other predetermined values are assumed at their final (November 1973) value, while the selected items take values at the selected time period.

^{2/} Additional portion (estimated at 150 mil. bu.) of U.S. exports to the USSR.

Two items of key interest with respect to the USSR wheat purchase are (1) the possible effect of information on the impending sale on ERS preparation of a wheat price forecast and (2) the effect of the purchase on the accuracy of ERS forecasts for the 1972/73 season-average farm price for wheat based on hindsight information. Information on the magnitude of the Soviet wheat purchases was largely complete for the November 1972 forecast. For model forecasting purposes, however, it was necessary to ascertain whether the 400 million bushels were already fully accounted for by the historical export relationship.

As indicated earlier, the export relationship in the wheat forecasting model suggested a little over 300 million bushels of wheat exports for the United States, based on the decline in world grain supplies as of November 1972. About 85 percent of this decline was in the USSR. Applying this factor to the 300 million bushels of expected U.S. wheat exports gives an expected purchase by the Soviets of around 250 million bushels, or 150 million bushels less than the actual purchase. In other words, the Soviets bought more than was expected based on historical knowledge. This purchase was treated in the model as an additional shift in export demand of 150 million bushels, beginning with the November 1972 forecast. The November 1973 forecast for U.S. wheat exports, based on other world grain production and wheat supplies in the major exporting countries, was about 1,040 million bushels. This compares with actual exports of 1,185 million bushels and would further support the argument of added Soviet purchases of about 150 million bushels after the close of the marketing year.

Admittedly, much judgment was required in determining the possible effects of the Soviet purchase on U.S. wheat price and utilization forecasts in 1972/73. By including the additional 150 million bushels in export forecasts as of November 1972, the model still estimated only \$1.56 per bushel, compared with the \$1.57 forecast by the committee and the final reported wheat price of \$1.76 per bushel shown in table 14. Additional declines in other world grain production after November 1972 contributed mostly to the revised price increase from \$1.57 to \$1.82.

While the additional purchase of 150 million bushels of wheat by the Soviets was the single largest factor contributing to upward revised price forecasts for wheat, revisions in other grain production and wheat supplies in the major exporting countries were also quite significant in their effect on the forecasting accuracy for U.S. wheat prices and utilization. Some indication of the relative importance of these factors is shown in table 20 for the 1972/73 marketing year. For example, the additional estimated wheat exports of 150 million bushels from the United States to the USSR could have contributed as much as 36 cents to the rise in wheat price forecasts ($\$1.82 - \$1.46 = \$0.36$), while the added decline in other world grain production estimates after May 1972 could have added as much as 26 cents per bushel to wheat price forecasts. However, the effects of these factors on wheat prices are not additive since the effects shown are dependent on stock levels in the United States.

Most of the errors in forecasts for U.S. wheat prices and utilization in 1972/73 were directly attributable to export market factors. More precise and

timely knowledge about possible Soviet purchases and estimated world grain supplies outside the United States would have improved forecasting accuracy for domestic usage and prices in the wheat economy. In addition, as stocks are drawn down to 400 million bushels or lower, wheat prices become much more sensitive to factors which influence U.S. exports, domestic usage, and domestic supplies. Consequently, determining the effect of such factors on price forecasts becomes increasingly difficult.

Data Input Considerations and Some Implications for ERS Forecasts 39/

Current economic forecasting in ERS is closely linked to data published by the Statistical Reporting Service (SRS). The quality of data observation and the availability or timeliness of such data are two important considerations for forecasters. To bring into better focus some of the current implications of SRS data collection for ERS forecasts, key methodological and legislative influences on data collection and dissemination are historically reviewed. This review is followed by some illustrative uses of SRS data series in the preparation of shortrun supply forecasts.

Historical background 40/.--Several sections of the United States Code (U.S.C.) contain specific references to the collection and dissemination of agricultural statistics. For example, a monthly crop report is to be published:

....a monthly crop report which shall be gathered as far as is practical from practical farmers..(will include) statements of crop conditions by States and the United States.... (Title 7, U.S.C., Section 411a).

Several specific code references--primarily to cotton, peanuts, and apples--place conditions on the type of information USDA may publish. For example:

...an officer or employee of the United States who authorizes or is responsible for the inclusion in any such report, bulletin, or other publication of any such prediction (of cotton prices)... shall upon conviction be fined not less than \$500 or more than \$5,000, or imprisoned for not more than 5 years, or both... (Title 12, U.S.C., Section 1141j (d)).

The agricultural data collection function began in 1863 with a basic corps of county, monthly crop reporters. This group was expanded to the township level in 1896 and probably remained the backbone of the data collection

39/ Material in this section was prepared by Randy Zeitner, agricultural economist, NEAD, ERS and Robert G. Hoffman, U.S. Dept. of Treasury.

40/ Much of the historical information prior to 1960 is based on The Statistical Reporting Service, Misc. Pub. 967, SRS, U.S. Dept. Agr., Wash., D.C., 1964. The historical information after 1960 is based primarily on discussions with persons in the Livestock Section, Estimates Division, SRS.

process until recent years. A variety of surveys, primarily the rural carrier survey and direct mail lists, supplemented the data gathered by the crop reporters. The U.S. Census of Agriculture, taken every 5 years, generally served as benchmarks from which subsequent estimates of crop and livestock production were generated.

The data collection system currently in use, the enumerative survey, was developed in pilot States in the early fifties. This survey, based on the Master Sample of Agriculture, selected tracts at random from an area sample and relied on enumerators to collect data items within each tract. By the early sixties, following extensive testing and assessment, 20 major States were at an operational level, generating State agricultural estimates within a predetermined range of coefficient of variation.

Since the early sixties, the basis of SRS crop and livestock estimates has gradually shifted to the enumerative survey, supplemented by mail probability surveys for greater detail. The current mail probability surveys, with nonresponse followup, have replaced earlier mail surveys such as the rural carrier survey. Crop estimates are determined primarily from the area frame of the enumerative survey, but livestock estimates also include information from the probability surveys to generate multiple frame estimates. These multiple frame estimates for livestock are currently fully operational in 23 major hog States and 34 major cattle States, accounting for about 96 percent of the total population of each species. The estimated coefficient of variation (the standard error of estimate as a percent of the mean) is about 1 to 2 percent at the national level and 5 percent at the State level. Since such statistics suggest that any U.S. livestock estimate could vary 2 percent from the "true" value, accurate and reliable check data are needed to eventually adjust initial estimates. Check data, such as slaughter data and information from processors, can eventually point to possible adjustments in the initial estimates that would still maintain the integrity of the probability sample and estimates. However, in a shortrun situation, the initial estimates of livestock numbers still may not appear correct until more detailed information on marketing and processing becomes available.

Using Economic Indicator Data in Preparing Livestock Supply Forecasts

Because of the nature of the division of labor, SRS does not integrate economic factors directly into initial livestock production estimates. However, some leading indicator type of data, such as farrowing intentions and marketing intentions of cattle on feed, are reported. Since such intentions are obviously subject to changes based on changing economic conditions as well as external forces, such as weather, it is sometimes feasible to include these along with economic determinants to generate improved shortrun supply forecasts.

Forecasting layer numbers.--Leading indicator data can be combined with important economic factors to forecast poultry production and can take several forms. Most short-term (quarterly) forecasting procedures for poultry supplies would utilize such leading indicator factors as pullorum testings, breeder flock numbers, eggs in incubators, hatchings (placements), and

production flock additions (eggs). The factors used to describe quarterly changes in egg production can be viewed in time-lag sequence as shown in table 21. Specification of such lags is determined by the nature of the production process for the commodity.

Forecasting equations for any one quarter would incorporate the factors described in table 21 along with other relevant factors such as seasonal shifts, current economic influences, and perhaps exogenous variables to take account of influences such as the ebb and flow of Marek's disease. Assuming the resulting estimating equations have captured the major factors influencing changes in layer numbers, forecasts can be prepared for up to a year ahead.

Forecasting June-November hog marketings.--A major concern users of SRS livestock statistics had during 1973 was the serious distortion of the usual relationships between inventory and slaughter. The following example demonstrates that some of this distortion can be explained by economic forces operating during the period. The example stems from an SRS report which examined historical relationships between hog and pig inventories and subsequent commercial hog slaughter. ^{41/} The example presented here will attempt to incorporate economic factors in the basic inventory-slaughter relationships, thereby enhancing their value as an aid in forecasting.

Only the relationship between the June 1 hogs for market inventory and the following June-November commercial hog slaughter is considered.

A simple regression of hogs slaughtered on inventory during 1964-72 in the SRS report shows an R^2 of 0.96:

$$(1) \quad Y = -7524.937 + 0.948 (X) \quad R^2 = 0.961 \\ (13.16)$$

where

Y = June-November commercial hog slaughter (1,000 head)

X = June 1 market hogs (1,000 head)

t = value shown in parentheses.

Had this equation been used to predict June-November 1973 slaughter from June 1 inventory, an extremely large error would have resulted (table 22). For 1973, the actual slaughter was 36.9 million head, while the estimated slaughter based on equation (1) below would have been 40.8 million head.

The large error of 11 percent for hog slaughter forecasts in 1973 based on equation (1) might be explained by such economic factors as the hog/corn price ratio. However, use of a linear specification of the profitability factor did not improve the forecasts. Since fixity of factors may force producers to

^{41/} Hog and Pig Reports: Surveying and Estimating Procedures and Review of 1973 Estimates, SRS 18, Apr. 1974.

Table 21--Length of lag for major variables affecting
quarterly layer numbers 1/

Factor	Time period									
	t_{-6}	t_{-5}	t_{-4}	t_{-3}	t_{-2}	t_{-1}	t			
Breeder flock										
testings <u>2/</u>	x	x	x	x						
Prices:										
Egg	x	x	x	x						
Broiler	x	x	x	x						
Corn	x	x	x	x						
Meal	x	x	x	x						
Replacement										
hatch <u>3/</u>		x	x	x	x					
Layer numbers <u>4/</u>										x

1/ From "Quarterly Egg Production Estimates," Hoffman, R.G., So. Jour. of Agr. Econ., Dec. 1970, pp. 155-160, and "Market Forecasts and Their Accuracy," R.F. Daly speech to Amer. Poul. and Hatch. Fed., New York City, Dec. 1967.

2/ Based on pullorum testings of breeder flocks.

3/ Includes egg-type and broiler-type pullets.

4/ Total layers including egg-type and broiler-type.

vary their production only for relatively large price changes in the short run, a nonlinear specification of the hog/corn price ratio was employed. Use of a cubic power of the deviation of the current hog/corn price ratio from the historic average was found to be useful in explaining hog slaughter adjustments. The estimated equation, with t values shown in parentheses was

$$(2) \quad Y = -11.92886 + 1.03811 (X_1) - 0.00516 (X_2^3) + 0.01053 (X_3^3)$$

(11.25) (1.26) (1.51)

$$R^2 = 0.973$$

where

Y = June-November commercial hog slaughter (1,000 Head)

X₁ = June 1 market hogs (1,000 head)

X₂ = January-March (hog/corn - hog/corn)³ where hog/corn = average from 1964-72

X₃ = April-June (hog/corn - hog/corn)³ where hog/corn = average from 1964-72

Results based on equation (2) are summarized in table 22.

While the forecast error was reduced to some extent with equation (2), further investigations are required to support this preliminary analysis. Furthermore, these regressions were computed with the final estimates of June market hog inventory as an independent variable. To be useful for predictive purposes, the preliminary estimate of June 1 market hog inventory would have to be used since final inventory estimates are not available until later.

For illustration, it is also interesting to note the possible impact of sampling error in hog inventory data on the forecasts of hog prices. Assuming a constant average weight for the slaughter hogs and a price flexibility coefficient of -2.5, a 2-percent underestimation in supply would result in a 5-percent overestimation in price.

Errors may also occur from the random disturbance associated with the basic economic model specification. Although it would be possible to have a sampling error and equation error that would offset each other, these errors could have an additive effect which would result in a larger error in supplies and the resulting price estimates.

Summary.--The methodology of the basic data collection process has changed through time and currently includes statistically defined sampling errors associated with most preliminary inventory and production estimates. The size of sampling errors associated with preliminary estimates can contribute to even larger price forecast errors. The preliminary estimates are eventually adjusted to final estimates based on accumulated check data, such as marketings which also contain a certain amount of sampling or measurement error.

Table 22--Summary of June-November commercial hog slaughter
actual and equation estimates

Year	Equation (1)			Equation (2)		
	Actual	Estimated	Residual	Actual	Estimated	Residual
	<u>Million head</u>					
1964	39.28	40.53	-1.25	39.28	40.01	-0.73
1965	35.08	35.14	- .06	35.08	35.29	- .21
1966	37.24	37.41	- .17	37.24	36.96	.28
1967	40.44	40.19	.25	40.44	40.47	- .02
1968	41.65	41.05	.61	41.65	41.25	.41
1969	40.29	39.39	.90	40.29	39.45	.83
1970	43.33	43.77	- .44	43.33	43.53	- .21
1971	45.91	45.61	.30	45.91	45.57	.34
1972	41.20	41.34	- .14	41.20	41.90	- .69
Prediction						
1973	36.87	40.76	3.89	36.87	39.71	2.84

This exploratory analysis indicates that a broad range of economic factors as well as leading indicators (intentions data) may offer key insights into developing better forecasts. For example, even though the June 1 hog inventory (final) is usually a good indicator of June-November hog marketings, economic factors (hog/corn ratio) may help explain deviations from this relationship.

Some Aggregate Models in ERS 42/

A number of economic models are being used or developed for use by ERS economists. In a 1973 survey of 47 models, it was found that 49 percent relied primarily on simultaneous equation techniques and 30 percent relied on simulation. Simultaneous and single equation regression techniques were most often used to estimate parameters (table 23).

Additional characteristics of the models included

- (1) Ninety-one percent of the models relied only on secondary data sources.
- (2) Most of the models are small, with 24 percent of them having 10 or fewer equations.
- (3) Seventy-nine percent of the models are currently operational, while 21 percent are in a developmental stage.

The 47 models documented so far are listed in table 24 by the principal mathematical method used. This survey contains an incomplete list of models used in ERS and no doubt is somewhat dated, since a number of the models listed have been substantially altered and several new ones have been developed.

While a number of the models in ERS provide useful background information for shortrun forecasting, few are specifically designed as forecasting models. Except for the Wharton short-term forecasting model for the general economy, there were no models used in ERS on a regular quarterly basis in 1973. However, some annual econometric models for soybeans, wheat, beef, pork, and oranges have been utilized in recent years on an irregular basis to provide background information to commodity analysts making annual forecasts for prices, utilization, and supplies. In addition, annual supply forecasts are frequently generated by a procedure referred to as the ACRE model. This procedure essentially combines the output of formal mathematical and statistical models with the judgment of policy analysts.

For the 47 models examined, only 7 focused on forecasting for subannual time periods. Another 15 annual models may be directly useful in shortrun and intermediate forecasting for the agricultural commodity sector. However,

^{42/} Basic information in this section was compiled with the assistance of Clark Edwards, agricultural economist, Economic Development Division, ERS.

Table 23--Distribution of models by type of mathematical and statistical technique

Model type	Distribution
	<u>Number</u>
Mathematical:	
Linear programming	5
Input-output	4
Simulation	13
Simultaneous equations	19
Single equation	1
Markov process	1
Other	0
Total	43
Statistical:	
Single equation	13
Simultaneous equations	22
Principal component	0
Other ^{1/}	10
Total	45

1/ Mostly synthetic derivation of coefficients.

Table 24--Models in ERS and their characteristics

No.	Model	Principal Researcher	Mathematical method ^{1/}	Statistical method ^{2/}	Data Source ^{3/}	Size ^{4/}	Stage ^{5/}
Annual Commodity Models:							
1	Aggregate Crop Response Estimation Model (ACRE)	Brown	Simul.	Sing.Eq.	Secondary	35	Operational
2	An Annual Model of the U.S. Orange Economy	Matthews	Sim.Eq.	Sim.Eq.	Secondary	32	Operational
3	An Economic Analysis of the Dynamics of U.S. Tobacco Markets	Mann	Sim.Eq.	Sim.Eq.	Secondary	14	Operational
4	Annual Beef Model	Matthews	Sim.Eq.	Sim.Eq.	Secondary	20	Operational
5	Annual Broiler Model	Heien ^{6/}	Sim.Eq.	Sim.Eq.	Secondary	15	Operational
6	Annual Egg Model	Heien ^{6/}	Sim.Eq.	Sim.Eq.	Secondary	14	Operational
7	Annual Livestock Model	Heien ^{6/}	Sim.Eq.	Sim.Eq.	Secondary	51	Developmental
8	Annual Model of Pork Economy	Heien ^{6/}	Sim.Eq.	Sim.Eq.	Secondary	15	Operational
9	Annual Soybean Model	Matthews	Sim.Eq.	Sim.Eq.	Secondary	25	Operational
10	Annual Supply Models for Feed Grains	Houck ^{6/}	Sing.Eq.	Sing.Eq.	Secondary	4	Operational
11	Annual Turkey Model	Heien ^{6/}	Sim.Eq.	Sim.Eq.	Secondary	16	Operational

See footnotes at end of table.

Continued

Table 24--Models in ERS and their characteristics--Continued

No.	Model	Principal Researcher	Mathematical method ^{1/}	Statistical method ^{2/}	Data Source ^{3/}	Size ^{4/}	Stage ^{5/}
12	Feed Grain Demand in the EEC	Regier	Simul.	Other	Both	6x6	Operational
13	Feed-Livestock Economy of the EEC	Regier	Sim.Eq.	Sing.Eq.	Secondary	22	Developmental
14	(GIVOFF) Model - MPS 360 Linear Programming System	Givan	L.P.		Both	394x 478	Operational
15	Policy Alternatives for Supply & Demand Blocks for Total U.S. Wheat	Hoffman	Simul.	Sing.Eq.	Secondary	26	Developmental
16	Prune Industry Model	Armbruster	Simul.	Sing.Eq.	Secondary	20	Operational
17	Soybean Supply Response	Boutwell	Simul.	Sing.Eq.	Secondary	6	Operational
18	Walnut Industry Model	Armbruster	Simul.	Sing.Eq.	Secondary	20	Operational
19	World Cross-Section Grain- Livestock Economy	Regier	Simul.	Sing.Eq.	Secondary	9	Operational
20	World Feed Grain Consumption	Regier	Simul.	Other	Secondary	88	Operational
	<u>Subannual Commodity Models</u>						
21	A Semiannual Model of the Broiler & Turkey Economies	Zeitner	Sim.Eq.	Sim.Eq.	Secondary	12	Developmental
22	A Semiannual Model of the Red Meat Economy	Linse	Sim.Eq.	Sim.Eq.	Secondary	13	Developmental

See footnotes at end of table.

Continued

Table 24--Models in ERS and their characteristics--Continued

No.	Model	Principal Researcher	Mathe- matical method ^{1/}	Statis- tical method ^{2/}	Data Source ^{3/}	Size ^{4/}	Stage ^{5/}
23	A Quarterly Forecasting Model for the Consumer Price Index for Food	Barr	Sim.Eq.	Sim.Eq.	Secondary	22x4	Operational
24	Price Forecasting Model for Monthly Low Cash Prices of Chicago No. 2 Corn & Decatur Soybean Meal 44	Overton		(Box-Jenkins)	Secondary		Operational
25	Quarterly & Shorter-Term Price Forecasting Models Relating to Cash & Futures: Quot. for Pork Bellies	Foot ^{6/}		Sim.Eq.	Secondary	12	Operational
26	Recursive Quarterly Price-Output Model of Beef-Pork Sector	Crom	Simul.	Sing.Eq.	Secondary	44	Operational
27	Trade Models: World Grain Trade	Rojko	L.P.	Sim.Eq.	Secondary	1,947 rows	Operational
28	Sector Models: A Simul. Model for Evaluating the Effect of Nat. Agr. Pol. Changes on Live-stock, Crop & Total Agr. Sector	Ray ^{6/}	Simul.	Other	Secondary	150	Developmental

See footnotes at end of table

Continued

Table 24--Models in ERS and their characteristics--Continued

No.	Model	Principal Researcher	Mathematical method ^{1/}	Statistical method ^{2/}	Data Source ^{3/}	Size ^{4/}	Stage ^{5/}
	Sector Models: (Continued)						
29	An Aggregate Model of U.S. Agriculture	Guebert	Sim. Eq.	Sim. Eq.	Secondary	4	Operational
30	An Econ. Framework That Links the Rice, Fish, Pork and Rub. Sec. of Vietnamese Agric. Econ. With the Nat. Acct. of Vietnam	Hoffman	Sim. Eq.	Sim. Eq.	Secondary	68	Operational
31	Annual Macro Model For Farm and Non-Farm Sectors	Heien ^{1/}	Sim. Eq.	Sim. Eq.	Secondary	72	Operational
32	Farm Program Impact Model	Nelson	Simul.	Sing. Eq.	Secondary	57	Operational
33	General Agr. Production Analysis System	Schluntz	L.P.	Other	Both	4,000 rows	Operational
34	Model for Predicting Level of Gross Farm Product Implied by a Set of Nat. Income & Product Accts.	Schluter	J-0	Sing. Eq.	Secondary	1	Operational
35	National Framework of Pro- duction Requirements	Schluntz	Simul.	Sing. Eq.	Secondary	150	Operational
36	Procedure for Solving Simultaneous Linear First Order Difference Equations	Kost	Sim. Eq.	Sim. Eq.	Secondary	50x 50	Developmental
37	Simulated Production Analysis: System (SIMPAS)	Quance	Sim. Eq.	Sing. Eq.	Secondary	7	Operational

Continued

See footnotes at end of table

Table 24--Models in ERS and their characteristics--Continued

No.	Model	Principal Researcher	Mathematical method ^{1/}	Statistical method ^{2/}	Data Source ^{3/}	Size ^{4/}	Stage ^{5/}
	Sector Models: (Continued)						
38	The Aggregative Income & Wealth (AIW) Simulator	Penson	Simul.	Sim. Eq.	Secondary	67	Operational
39	Wharton Short Term Forecasting Model for the General Economy	Barr		Sim. Eq.	Secondary	306x8	Operational Other
40	World Feed-Livestock Model	Urban	L.P.	Sim. Eq.	Secondary	4,600 rows	Developmental
	Management Decision Models:						
41	Allocation of AMS Budget for Surplus Commodity Removal (Sec. 32)	Haidacher	Simul.	Other	Secondary	40	Developmental
	Interindustry Models:						
42	Economic Impact of Food Stamp Program on a Local Economy	Matsumoto	I-O	Other	Both	8x8	Operational
43	Interindustry Structure of the United States	Schluter	I-O	Other	Secondary	478x478	Operational
44	Multi-County Input-Output	Petrulis	I-O	Other	Secondary	86x86	Operational

See footnotes at end of table.

Continued

Table 24---Models in ERS and their characteristics

No.	Model	: Principal : Researcher :	: Mathe- : matical : method ₁ /	: Statis- : tical : method ₂ /	: Data : Source ₃ /	: Size ₄ /	: Stage ₅ /
45	Markov Process	Cobb	Markov		Secondary		Operational
46	Multicounty Activity Analysis	Williams	L.P.	Other	Secondary	300 rows	Developmental
47	Rural-Urban Growth of Population, Income, & Employment	DePass	Simul.	Other	Secondary	7	Operational

: Other Models:

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- 1/ L.P. = linear programming; I-O = input-output
Simul. = simulation; Sim. Eq. = simultaneous equations; Sing. Eq. = single
equation; and Markov = Markov process.
- 2/ Sing. Eq. = single equation regression; Sim. Eq. = simultaneous
equations; and P.C. = principal component.
- 3/ Classified as secondary, or combination primary and secondary
- 4/ Single numbers refer to number of equations unless otherwise specified. Two numbers, such as 4x5,
refer to size of the models matrix--rows and columns.
- 5/ Stage of development of models.
- 5/ Contractor.

further evaluation and testing of these models are required before rendering a judgment on their relative merits. Except for the Wharton School model for the general economy and a semiannual beef and pork model, little is known or presented about the forecasting performance of any of the above models.

Of some interest in connection with annual models is the possibility of developing procedures to generate subannual forecasts from annual forecasts. Such an approach would appear to be less complex and less expensive than developing formal, comprehensive, and monthly or quarterly models and would have the added advantage of producing forecasts over a longer period of time. The value of such an approach would again need to be formally evaluated relative to other approaches.

CONCLUSIONS

Organization Findings

While many deficiencies in the forecasting activity that existed prior to July 1, 1973, were remedied significantly by the ERS reorganization, some remain and some new ones have been created. A basic remaining problem is the inadequate framework for global analyses identified by the Fox report. Although the present report finds that a substantial number of elements for such a framework can be identified in ERS, there is still general agreement with the Fox report on this issue.

In addition, the problem of coordinating program elements in the forecasting activity is greatly magnified. Responsibilities are now dispersed more widely among the three commercial agricultural divisions, thus creating problems with respect to scheduling of activities and analyses and overall technical review of forecasting and outlook analyses.

To make the basic organizational framework in ERS work effectively for the forecasting activity, a continued focus and effort will be required. Some minor revisions in the present organizational structure should also be considered.

Personnel and Staffing

Although it will be some time before the full benefits of the reorganization are realized with respect to existing staff, there will still be a shortage in staff devoted largely to the forecasting activity. Deficiencies exist particularly for staff with the skills and training required to implement and utilize a host of contemporary forecasting techniques and methods. Moreover, given that a nucleus of appropriately qualified staff is obtained, a critical problem requiring explicit attention is the continual maintenance of experienced expertise in that nucleus. This applies to staff needed for individual commodity forecasting in the foreign and domestic areas, as well as staff responsible for the broad technical review and appraisal of forecast information.

Methodology and Procedures

The particular methods used in developing ERS forecasts, although very detailed in many respects, are quite informal compared with more structured quantitative models. As a consequence, it is much more difficult to verify the procedures and forecasts in a scientific sense. Information compiled in this report suggests that such procedures can eventually be verified and consequently more fully evaluated in a scientific context, but continued emphasis on formal model use is also needed. Implementation of an objective forecast evaluation procedure that is used regularly would provide a basis for improved forecast performance.

In the process of examining the initial set of questions and issues regarding ERS forecasting activities, several additional issues which warrant further investigation were identified. These include (1) specification of appropriate procedures for measuring the forecast error; (2) determination of actual sources of forecast error, (3) determination of the implications of forecast error, and (4) use of futures quotations in forecasting cash market prices. Identification of these and other issues which bear upon the task of forecast evaluation should receive fuller treatment if a definitive and comprehensive set of conclusions about ERS forecasts is to be made.

APPENDIX A -- STATEMENTS PREPARED BY ERS ANALYSTS
IN RESPONSE TO A QUESTIONNAIRE ON FORECASTING PROCEDURES

Forecasting Questionnaire

Part I. Commodity Specific Program Areas

1. List regularly published reports on outlook and frequency of reports originating in your program area.
2. List outlook meetings and conferences in which you participate (1972 and 1973).
3. List interagency committees and conferences on outlook policy and projections in which you participate regularly.
4. List items for which forecasts are prepared on a regular basis. The list should be explicit as to what specific prices and/or quantities are forecasted; for some items brief definitions may be appropriate. (Each item is to be included in your table 1.)
5. Review illustration 1 itemizing techniques and methods for completeness. Add additional categories if needed and number beginning with 24.
6. Review your listing of data series and sources for completeness (an illustration from fats and oils is included). If data series computed from other data sources within the program area are used, list these data series and explain the computational procedures associated with their derivation (code the above information under No. 30 in the case of fats and oils using lower case alphabetic letters for ordering: i.e., 30(a), 30(b), 30(c), 30(d)...etc.). Also indicate and identify data or forecasts which are required from program areas other than your own (for coding purposes, proceed as above using No. 32 on the fats and oils example).
7. Complete table 1 using illustrations 1 and 2 as a reference. Note illustration 2 is your listing of data series and sources.
8. Briefly describe the steps by which you prepare forecasts covering production, consumption, and price items. In other words, discuss the order in which data or other relevant factors are analyzed including some mention of analysis. Does the procedure change from quarter to quarter? (We recognize that this is asking for the more or less mechanical aspects of your forecasting procedure and that a considerable amount of personal experience enters throughout the procedure bearing heavily upon the forecasts.)
9. If you use estimated parameters (elasticities, flexibilities, etc.) or relationships (seasonality adjusters, regression equations, etc.) list and define these. Briefly describe where and how these enter, if not evident from your previous response.

10. Indicate briefly, a few key areas which might be investigated toward improving our outlook mission. (Data, technique, publication, organization, or other issues can be itemized.) Alternatively, what are the most critical factors which affect your forecast accuracy?
11. If it is not already evidenced in your above responses, what type of coordination is there between your forecasts and the forecasts by others within ERS? How formal is this, i.e., with what regularity?

Part II. Noncommodity Specific Program Areas

1. Prepare short statement of current work on, or closely related to, shortrun forecasting.
2. How is the activity in (1) coordinated with other units concerned with shortrun forecasting?
3. Indicate some areas where shortrun forecasting analysis might be improved.
4. Itemize data or forecasts required in your work which is taken from other units.
5. Itemize key data and forecasts which you are required to submit to others.

Statement by Analysts in the Poultry Program Area ^{1/}

- I. Regularly Published Reports and Prepared Statements on Outlook
 - A. Published reports originating in program area
 1. Poultry and Egg Situation -- published 5 times a year.

- B. Prepared Statements

Outlook statements are prepared regularly for incorporation into Situation and Outlook reports, including the Demand and Price Situation, the National Food Situation, the Agricultural Outlook Digest, and various other reports.

^{1/} Material in this section was prepared primarily by Gerald Rector, agricultural economist, CED, ERS.

II. Participation in Outlook Meetings and Conferences

- A. National Outlook Conference
- B. Regional and State Outlook Conferences
- C. International Egg Commission Conferences
- D. Quarterly Poultry Survey Committee outlook meetings
- E. Various governmental, industry, and association meetings

III. Participation in Interagency Committees and Conferences on Outlook

- A. Member of Interagency Commodity Estimates Committee on Poultry and Eggs
 - 1. Committee has been inactive.
- B. Member of Animal Numbers Committee
- C. Member of Marketing Guides Committee for Poultry and Eggs
 - 1. Program was suspended in early 1973.

IV. Items for which Forecasts are Prepared on Regular Basis

- A. Monthly farm price estimates of
 - 1. Eggs
 - 2. Broilers
 - 3. Chicken (excluding broilers)
 - 4. Turkeys
- B. Quarterly and annual estimates of
 - 1. Production of eggs, chicken, broilers, and turkeys.
 - 2. Farm prices of eggs, chicken, broilers, and turkeys.
 - 3. Wholesale prices of eggs, broilers, and turkeys.
 - 4. Retail prices (converted to an index, 1967=100) of eggs, frying chicken, chicken breasts, turkeys, and weighted index of total poultry.
- C. Estimates of annual supply and utilization of eggs, all chicken, and turkey
 - 1. Supply -- production, imports, and beginning stocks.
 - 2. Utilization -- ending stocks, exports and shipments, military purchases, civilian consumption (in the case of eggs, the number of eggs used for hatching and breaking are also calculated).
- D. Estimates of per capita consumption
 - 1. Quarterly estimates of shell eggs, processed eggs and total eggs; broilers, other chicken and total chicken; turkey and total poultry.

V. Reports and Publications Containing Statistics Used in Poultry and Eggs

The name of the publication or report, source, period issued, and data obtained are listed under the following general format:

- 1st line -- Name of publication
- 2nd line -- Source of publication
- 3rd line -- Period issued
- 4th line -- Data obtained from publication

A. Agricultural Prices

SRS Crop Reporting Board
Monthly

1. Farm prices for chicken (excluding broilers), broilers, eggs, and turkeys--all but broilers are midmonth prices but all are used as monthly prices.
2. Midmonth prices for laying feed, broiler grower feed, and turkey grower feed.
3. Midmonth egg-feed price ratio, broiler-feed price ratio, and turkey-feed price ratio.

B. Eggs, Chickens, and Turkeys

SRS Crop Reporting Board
Monthly

1. Monthly egg production, production per 100 layers, average number of layers on farms, number of chicks and poults hatched, pullet chick placements for hatchery supply flocks, and number of chickens and turkeys tested for pullorum-typhoid.
2. First of month--number of layers on farms, eggs laid per 100 layers, chicken and turkey eggs in incubators, and percentage of hens and pullets of laying age being force molted and with molt completed.
3. Annual revisions of hatchery production and hatchery capacities for chickens and turkeys.
4. Inventory numbers--4 times a year the number of hens and pullets of laying age, pullets 3 months old and older not yet laying, and potential layers.
5. On December 1--the number of hens and pullets of laying age, pullets 3 months old or older not yet laying, pullets under 3 months of age, other chicken, all chicken, value per head, and total value of all chicken.
6. Yearly September 1 intentions of producers to hold turkey breeder hens.

C. Chickens, Eggs, and Broilers

SRS Crop Reporting Board

Annually

Yearly production, disposition, value and cash receipts of eggs, chicken (excluding broilers), and broilers.

D. Turkeys

SRS Crop Reporting Board

3 times a year

1. Intentions to raise turkeys (20 States), breeder hens on farms and value December 1 (26 States), and turkeys raised.
2. Number of turkeys raised, pounds produced, and gross farm income (previous year).
3. Number of turkeys raised (current year).

E. Poultry Slaughter

SRS Crop Reporting Board

Monthly

Young chicken (broilers), mature chicken, and turkey: number and pounds inspected and average live weight, pounds certified ready-to-cook, and pounds inspected for further processing and cut-up. Commercial production of poultry.

F. Livestock Slaughter

SRS Crop Reporting Board

Monthly

Commercial production of total red meats.

G. Cold Storage

SRS Crop Reporting Board

Monthly

First-of-month holdings of: shell eggs, frozen eggs, chicken, turkey, total poultry, and red meats.

H. Egg Products

SRS Crop Reporting Board

Every 4 weeks

Number of shell eggs broken under Federal inspection and pounds of liquid, frozen, and dried egg product produced.

I. Delmarva Broiler Chick Report

SRS Maryland-Delaware Crop Reporting Service

Weekly

Number of broiler-type eggs set and chicks placed in 21 States.

J. Oregon Weekly Chick Report

SRS Oregon Crop and Livestock Reporting Service
Weekly
Layer-type eggs set in Washington, Oregon, and California.

K. Georgia Weekly Hatchery Report

SRS Georgia Crop Reporting Service
Weekly
Layer-type eggs set in Georgia and Mississippi.

L. Minnesota Weekly Turkey Report

SRS Minnesota Crop and Livestock Reporting Service
Weekly
Turkey poults hatched and eggs set in 9 States.

M. Hatchery Production

SRS Crop Reporting Board
Annually
Annual revisions of weekly broiler-type egg sets and chicks placed.

N. Dairy and Poultry Market News

Agricultural Marketing Service
Daily, weekly, monthly

1. Daily and monthly shell egg prices: Received by producers in Georgia and Iowa, wholesale at New York, and delivered to volume buyers in Los Angeles.
2. New York and Philadelphia frozen egg prices.
3. Weekly and monthly 9-city weighted average wholesale broiler price and prices for three of the nine cities (Chicago, Los Angeles, and New York).
4. Monthly and weekly New York wholesale prices for young tom turkeys (14-20 pounds and heaviest weights) and young hen turkeys (8-16 pounds); Chicago wholesale prices for toms (heaviest weights) and hens (12-14 pounds).
5. Weekly reports of the number of eggs delivered to breakers and received from farmers.
6. Weekly reports of the number of chickens and turkeys (by type) slaughtered in Federally inspected plants.

O. Exports, Commodity by Country - FT 410

Bureau of Census, Foreign Trade Division
Monthly
Exports of poultry and eggs.

P. Imports, Commodity by Country - FT 135

Bureau of Census, Foreign Trade Division
Monthly
Imports of poultry and eggs.

Q. Shipments, Puerto Rico and U.S. Possessions - FT 800

Bureau of Census, Foreign Trade Division
Monthly
Shipments of poultry and eggs to U.S. territories.

R. BLS Prices

Bureau of Labor Statistics
Monthly
Retail prices of eggs, frying chicken, chicken breasts, and turkey.

S. Population

Rural Development Service-Research Division
Periodically
Average U.S. population by months, quarters, and years (current and forecasted).

T. Military procurements

Monthly
Purchases by the military of eggs and poultry.

U. Government purchases

Agricultural Marketing Service-Poultry Division
Periodically (whenever purchases are made)
Purchases of poultry and eggs under Section 32 of Public Law 74-320.

V. Computed from existing data:

1. Layer-type replacement hatch--1/2 of monthly layer-type hatch.
2. Pullet chicks placed for laying flocks-1/2 of layer type hatch plus pullet chicks placed domestically for broiler hatchery supply flocks.
3. Index of seasonal variation for egg production, rate of lay, size of laying flock, farm price, and wholesale price.
4. Eggs used for hatching--calculated from monthly layer-type and broiler-type hatch converted to eggs needed to hatch this number by using a hatchability ratio obtained from hatchery production figures.

5. Eggs broken commercially and egg products produced monthly--converted from a 4-week number.
6. Per capita consumption of broilers, total chicken, turkeys, and eggs--computed by adding production, imports, and beginning stock minus ending stocks, exports and shipments, and military taking (for shell eggs, eggs used for hatching, and eggs used for breaking are also subtracted).
7. Estimates of broiler hatchery supply flocks based on domestic placements 7-14 months earlier.
8. Turkey hatchings advanced to indicate prospective months of marketing--light breeds (4 months), heavy breeds (hens 5 months and toms 6 months).
9. Broiler chick placements in 22 States advanced 2 months to expected marketing months.
10. Marketing margins between farm prices, wholesale prices, and retail prices.
11. Indices of seasonal variation of production and prices of broilers and turkeys.

W. From appropriate program areas:

1. Historical prices, current prices, and estimates of future prices of corn.
2. Historical prices, current prices, and estimates of future prices of soybean oilmeal.
3. Estimates of corn production and supplies available for domestic use.
4. Estimates of soybean production and supplies available for domestic use.
5. Current fed cattle prices and estimates of fed cattle prices and production.
6. Current pork prices and estimates of pork prices and production.
7. Per capita consumption of beef, veal, pork, sheep, and total red meat--historical figures and estimates of future consumption.
8. Data on current and expected conditions of the general economy--historical and forecasted per capita disposable income and number of people employed.
9. Feed units used per dozen eggs, per 100 pounds of broilers, and per 100 pounds of turkeys produced.

VI. A Brief Description of the Steps by which Forecasts are Prepared

A. Production

1. Eggs--Egg production is forecast for any point in time or period of time by multiplying the expected laying flock size times the rate of lay.

$$EP = LFS \times ROL$$

where

EP = egg production

LFS = laying flock size

ROL = rate of lay

- a. Laying Flock Size--To forecast laying flock size, the current laying flock size is added to the number of replacement pullets expected to enter the flock minus the number of layers removed from the flock (due to cullings and mortality).

$$LFS = LFS_t + RP - (OLC + M)$$

where

LFS_t = current laying flock size

RP = number of replacement pullets

OLC = number of old layers culled

M = mortality rate

- b. Replacement pullets--To determine the number of replacement pullets expected to enter the flock 6 months or less in advance, we look at the monthly hatchings of layer-type chicks for the previous months. Then these hatching figures are compared to year-earlier figures to determine the change in the number of pullets available for replacements in the next 6 months. Plus, inventory reports 4 times a year which show the number of pullets not yet laying are received.

If our forecast period is greater than 6 months ahead, the monthly hatchings of layer-type chicks for the first 6 months are determined. Additional factors are used to forecast the number of replacement pullets for the balance of the forecast period. Such factors as: Expected production costs (especially feed prices), the demand prospects for eggs to be used for hatching and breaking, the demand prospects for high protein foods, and expected prices received by farmers for eggs. Then these factors are compared with the same factors a year earlier to determine the change in the number of replacement pullets expected.

- c. When forecasting the number of old layers removed from the laying flock, the same factors are considered as when forecasting the number of replacement pullets more than 6 months ahead. In addition, the age of the laying flock and factors that may affect the mortality rate (new disease vaccines and disease outbreaks) are considered.

- d. Rate of Lay--Basically the rate of lay a year earlier is taken and adjusted for current and expected changes in several factors that influence the rate of lay. Changes in the age of the laying flock can affect the rate of lay because younger birds lay more eggs per hen. Feed prices also have to be considered since they influence the makeup of the laying rations which in turn affect the rate of lay. Also, such factors as new disease vaccines, genetic advances, and improvements in production practices affect the rate of lay. Seasonality factors are also considered.
2. Broilers--The method used to predict broiler production depends on how far in the future we wish to forecast.
 - a. For periods of 3 months or less in advance, we look at the weekly reports of broiler-type eggs set and chicks placed. The weekly reports of chicks placed 1-9 weeks previous plus the eggs set 1-3 weeks previous are totaled. The change in the chicks placed and eggs set from the comparable weeks a year earlier is then determined. Next, this change is related to year-earlier production to get expected production.
 - b. For periods of greater than 3 months, we look at such factors as: production costs (especially feed prices), current and expected broiler prices, prospects for prices of competing meats, disposable personal incomes, and the size of the broiler hatchery supply flock. Year-earlier production is then adjusted for changes in these factors. Also, historical production trends and seasonality factors are considered.
 3. Turkeys--Factors looked at when forecasting turkey production are:
 - a. Intentions to hold breeder hens
 - b. Intentions to raise turkeys
 - c. Number of breeder hens on farms December 1
 - d. Monthly poult hatchings advanced to the months of prospective marketing
 - e. Turkeys tested for pullorum disease
 - f. Seasonality factors
 - g. Cold storage stocks of turkeys
 - h. Prospects for beef, pork, and broiler production

For forecasts of 6 months or less in advance, monthly hatchings of poults are advanced to their prospective month of marketing to indicate expected production. The changes in these advanced marketings from a year earlier are determined and then related to year-earlier production to get expected production.

Intentions to raise turkeys, breeder hen numbers, and turkeys tested for pullorum disease give an indication of longer term prospects for turkey production. However, cold storage stocks of turkeys, expected production costs (especially feed prices in the main hatching season of March-July), seasonality factors, current turkey prices, historical production trends, and prospects for beef, pork, and broiler production are considered before final production forecasts are made.

B. Prices

1. Monthly forecasts of egg, broiler, chicken (other than broilers), and turkey farm prices. For eggs, broilers, and turkeys, we look at changes from a month earlier in the wholesale price for the week before the 15th of the current month. Then we relate this change to a month earlier farm prices to get forecasts for current farm prices. Allowances are made for rapidly changing prices in the previous month and/or current month. Chicken (other than broilers) prices are determined by looking at light and heavy hen prices at the farm in certain key areas in relation to a month earlier.
2. Eggs--When forecasting egg prices, certain key factors are included:
 - a. Egg production
 - b. Prospects for prices of high protein foods
 - c. Demand prospects for eggs used for hatching and breaking purposes
 - d. Seasonality indices
 - e. Prospects for Government purchases
 - f. Current egg prices

A tentative price is arrived at by using a flexibility to determine what the expected changes in production from a year earlier would "normally" change egg prices from a year earlier. These prices are then adjusted for current and expected changes in market conditions such as: high prices of other protein foods, demand for eggs for hatching and breaking purposes, and Government purchases. Also, abnormalities in the seasonal pattern of egg prices are also considered.

Although we forecast farm, wholesale, and retail prices of eggs, wholesale prices are usually forecast first. Farm and retail prices are forecast by using historical marketing margins adjusted for current and expected changes.

3. Broilers

- a. Prospects for production and prices of pork, beef, and turkeys
- b. Broiler production
- c. Seasonality factors
- d. Current prices
- e. Prospect of personal disposable income

A tentative price is arrived at by using flexibilities that indicate the change from a year earlier in the price of chicken associated with the change from a year earlier in per capita consumption of beef, chicken, pork, and turkeys, plus changes in disposable income. These prices are then adjusted for current and expected changes in the relationship between chicken prices and the prices of competing meats. Since broiler prices usually follow a seasonal pattern, adjustments are made for this seasonal pattern and any current or expected abnormalities in the pattern.

Wholesale broiler prices are usually predicted first. Then farm and retail prices are forecast using historical marketing adjusted for current and expected changes.

4. Turkeys

- a. Prospects for production and prices of pork, beef, and chicken
- b. Turkey production
- c. Current prices
- d. Seasonality factors
- e. Prospects of personal disposable income
- f. Cold storage stocks of turkeys
- g. Prospects for Government purchases

Basically the same procedure for turkeys is used as with broilers. But cold storage stocks and Government purchases are also taken into consideration when forecasting turkey prices.

C. Consumption

The consumption of eggs, chicken, and turkeys is forecast on a balance sheet approach. This requires estimates of production, changes in cold storage stocks, imports, exports, shipments, and military takings. (In the case of eggs, eggs used for hatching and breaking are also estimated.)

For chicken, consumption of broilers, other chicken, and total chicken are estimated. We only estimate quarterly per capita consumption of broilers. For eggs, consumption of shell eggs, processed eggs, and total eggs are estimated. Monthly and quarterly per capita consumption estimates are made only for shell eggs. Annual and quarterly per capita consumption estimates are made for turkeys.

1. Annual quarterly and monthly estimates
 - a. Annual estimates--production + imports--(exports + shipments + military takings) \pm change in cold storage holdings (in the case of eggs, hatching eggs are also subtracted).
 - b. Quarterly estimates
 1. broilers--estimates made same as annual but only for broilers.
 2. turkeys--same as annual.
 3. eggs--same as annual except eggs used for breaking are taken out in order to get estimates for shell eggs only.
 - c. Monthly estimates--monthly estimates are made for shell eggs, broilers, and turkeys, but shell egg figures are the only ones published.
2. Estimation of the various components used in forecasting consumption
 - a. Production--estimates for chickens, eggs, and turkeys are made in the manner shown in the production section.
 - b. Changes in cold storage--to estimate the change in cold storage stocks, the previous year's figures are adjusted depending on expected production and demand for eggs, chickens, and turkeys.
 - c. Imports, exports, shipments, and military takings--estimates of these depend on domestic production and prices and their relationship with the rest of the world. Basically, the previous year's figures are adjusted for expected changes in prices and production. Plus, such as in the case of exports and shipments of turkeys, a trend factor is considered.
 - d. Hatching eggs--estimates of eggs used for hatching are based on expected changes in chicks needed for broiler production and the laying flock.
 - e. Breaking eggs--estimates of eggs used for breaking are based on expected prices of shell eggs and egg products. Usually, fewer eggs are broken if shell egg prices are high. Also, a seasonality index is used.

VII. Some Commonly Used Parameters and Relationships

A. Elasticities and Flexibilities

1. Eggs--the farm price elasticity of the demand for eggs varies with different studies. We have usually used an elasticity between $-.20$ and $-.25$. Using the assumption that the inverse of the elasticity approximates the flexibility, we come up with a flexibility of 4 to 5. This says that a 1 percent change in quantity is associated with a 4 to 5 percent change in price in the opposite direction.

2. Price flexibility coefficients for chickens and turkeys as reported by Rex Daly in an ERS memo release entitled, "Market Forecast and Their Accuracy."

Effect on farm prices of chicken and turkeys of a 1-percent
change in per capita consumption and income

	<u>Chicken</u>	<u>Turkey</u>
Beef and veal	-.483	-.427
Hogs	-.600	-.686
Sheep and lambs	-.077	-.110
Chicken	-1.859	-.540
Turkey	-.207	-1.620
Income	.974	1.388

B. Seasonality adjusters

Since production and prices of eggs, chickens, and turkeys have very distinct seasonal patterns, we use seasonality indices extensively when forecasting. We have monthly and quarterly seasonality indices which are updated annually.

1. Seasonality indices for eggs
 - a. size of the laying flock
 - b. rate of lay
 - c. daily average egg production
 - d. farm prices
 - e. wholesale prices
2. Seasonality indices for broilers
 - a. broiler placements
 - b. federally inspected broiler slaughter (number and pounds live weight)
 - c. size of broiler hatchery supply flock 7-14 months earlier
 - d. broiler prices received by farmers
 - e. 9-city wholesale prices
 - f. BLS price for frying chicken
3. Seasonality indices for turkeys
 - a. turkey farm price
 - b. New York wholesale (young hens 8-16 pounds)
 - c. New York wholesale (young ~~toms~~ 14-20 pounds)
 - d. BLS retail store prices
 - e. turkey poults hatched by hatcheries (heavy and light breeds)
 - f. turkeys slaughtered under Federal inspection (number and pounds)

C. Regression equations

Although we do not use regression equations every time we forecast, we do use them regularly to check our forecasts.

There are two different econometric models we look at when forecasting egg production. These are the Hoffman and the Roy and Henson models.

1. Roy and Henson's model:

$$Y_t = a + b_1 D_1 + b_2 D_2 + b_3 Y'_{t-1} + b_4 E_{t-1} + b_5 R_{t-1} + b_6 L_t$$

where

- Y_t = total U.S. egg production, in millions
- D_1 = 1 for first quarter, 0 otherwise
- D_2 = 1 for second quarter, 0 otherwise
- Y_{t-1} = total U.S. production during the (t-1) period, in millions
- R_{t-1} = chicks placed for laying flock replacements during the (t-1) period, in millions
- L_t = log of the number of layers on farms the first day of the current quarter, in millions

2. Hoffman's model is the one published in the December 1970 issue of the Southern Economics Journal entitled, "Quarterly Egg Production Estimators."

3. Roy and Henson's egg price predicting equation:

$$P = B_0 + B_1 D_1 + B_2 D_2 + B_3 Y_t - A_2 B_3 Y_{t-1} + (A_1 + A_2) P_{t-1} - (A_1 A_2) P_{t-2} + B_4 H_t + B_5 (BR_t - BR_{t-1})$$

where

- D_1 = 1 for first quarter, 0 otherwise
- D_2 = 1 for second quarter, 0 otherwise
- Y_t = log of U.S. production of eggs in millions (current quarter)
- Y_{t-1} = log of U.S. production of eggs in millions (t-1 quarter)
- P_{t-1} = log of the average egg price in cents per dozen (t-1 quarter)
- P_{t-2} = log of the average egg price in cents per dozen (t-2 quarter)
- H_t = log of U.S. total amount of eggs used for hatching, in 1,000 cases (current quarter)
- BR_t = log of U.S. total amount of eggs broken commercially, in 1,000 cases (current quarter)
- BR_{t-1} = log of U.S. total amount of eggs broken commercially, in 1,000 cases (t-1 quarter)

A_1 = distributed lag parameter
 A_2 = auto-correlation coefficient

4. Broiler price equations

$$BPW = b_0 - b_1 BPD - b_2 MB - b_3 MP + b_4 MT + b_5 I + b_6 BPW_{t-1}$$

where

BPW = quarterly average, ready-to-cook, wholesale prices--
major cities; cents per pound

BPD = quarterly production, ready-to-cook, broiler meat--
pounds per capita

MB = quarterly supply, beef and veal, production plus
beginning stocks plus imports; pounds per capita

MP = quarterly supply, pork, production plus beginning
stocks plus imports; pounds per capita

MT = quarterly supply, turkey, production plus beginning
stocks; pounds per capita

I = quarterly disposable income (annual rate)

VIII. Although there are several econometric models for eggs, broilers, and turkeys, some are outdated while others are complicated and much time and effort is needed to update them. Other models are almost impossible to update because the estimating parameters have been calculated using a liberal amount of judgment by the author along with regular estimating techniques.

We need some simple basic quarterly forecasting equations that can be used to obtain estimates for rush requests. Also, up-to-date elasticity and flexibility coefficients for poultry and eggs would be helpful. This section is in the process of examining several econometric models to determine their usefulness for incorporation into our forecasting work. The more useful models are being updated to reflect current data. Also, a quarterly livestock model which includes beef, pork, lamb, broilers, and turkeys is being evaluated and updated.

The most critical factors that affect our forecast accuracy are the estimates of feed prices, prices and production of red meats, and disposable income. In addition, our ability to determine and interpret changes in market conditions and whether the changes are temporary or permanent is critical.

Statement by Analysts in the Commodity Program
and Policy Analysis Program Area ^{2/}

Statement of Current Work

The Commodity Program and Policy Analysis (CPPA) program area presently has plans to maintain the capability to estimate acreages, yields, and production for the four feedgrains, wheat, soybeans, and cotton. In addition to the production parameters, estimates can also be made of program participation, set-aside acreages, and Government payments. The estimates are made for the United States, seven U.S. regions, and for individual States if there is a need. The estimates can be made 1 year at a time, up to 3 to 4 years ahead.

The method for making the forecasts is embodied in a systematic approach known as the ACRE model (Aggregate Crop Response Estimator). Briefly, this approach involves an up-to-date State, regional, and U.S. data base providing quantities and trends in acreage, production, yields, program participation, and set-aside acreages. In addition, a set of crop budgets has been developed for major crops in each region. Each budget depicts average variable costs of production for a relatively homogenous, multicounty resource area within a State. The crop budgets are used to evaluate acreage changes due to changes in relative profitability and to evaluate the opportunity cost of set-aside acreage.

The ACRE model is regionally oriented and does not involve one specific formal model. Instead, unique methods and relationships are applied in each region, given a common set of assumptions and specifications for each specific problem. Quantitative methods are used where applicable. In this way, the ACRE model can assimilate the latest useful data and can make use of the most recent research results, whether it be a new or improved methodological tool, or a recent estimate or identification of a production parameter.

Coordination with Other Units

Better knowledge or data in the following areas would aid in improving shortrun forecasts:

1. More exact information on cropland availability and capability.
2. Information on how farmers form price and net return expectations.
3. Better data on cost and yield variability.
4. Continued research and estimation of price elasticities.
5. Models for estimating hay and forage production.

^{2/} Material in this section was prepared primarily by Milton H. Ericksen and Dave Culver, agricultural economists, CED, ERS.

Data or Forecasts from Other Units

There is no formal procedure or routine delivery of data or forecasts from other units to CPPA for specific use in the ACRE model. The ACRE model can benefit from production cost data, yield data, supply response models, and estimates of production parameters available in other units. Forecasts of supply response made in other units can supplement or substitute for forecasts of specific crops in the ACRE model. The ACRE model also depends on other units to some extent for estimates of other crops not included in the ACRE model.

Key Data and Forecasts Submitted to Other Units

Although CPPA at present does not have any scheduled commitments to provide data or output from the ACRE model to other units, a goal is to always have available the forecast of acreage, yield, production, program participation, and program cost for the latest announced or anticipated provisions. A primary purpose of the ACRE model is to respond to requests for estimating Government program participation and the production response of crops for a given set of program provisions. Sets of program provision or specified production conditions can come from other units or other agencies. The ACRE model can also be used to evaluate planting intentions reports.

Statement by Analysts in the Sector Performance Measures Program Area on Farm Income Forecasts^{3/}

Current Work

Shortrun forecasting of farm income and production expenses is a major responsibility in the Farm Income Research (FIR) Unit. A major change in forecasting procedures recently has been to make forecasts by calendar quarters in contrast to a calendar year basis only. The change to quarterly forecasts has enabled FIR to pinpoint periods of change more precisely than in earlier years.

To determine gross farm income, price and quantity forecasts are collected from CED commodity analysts. Prices are obtained on a quarterly basis for all major livestock and crop items, except fruits and vegetables. Livestock output or marketings are obtained mainly on the basis of change from year-earlier periods. For crops, commodity specialists deliver forecasts of new crop size; FIR analysts then make their own estimate of how the marketings will be split by calendar quarters and between calendar years.

^{3/} Material in this section was prepared primarily by Mardy Myers, agricultural statistician, NEAD, ERS.

Direct Government payments to farmers are forecast by grain and cotton analysts, and FIR combines these with noncrop payments to make a forecast of total payments.

Production expense estimates are almost solely a function of the FIR staff. From various specialists on farm inputs, some information is obtained relative to possible changes in fuel, fertilizer, interest, labor, and other charges. This is supplemented with data from the Demand Analysis Unit on changes in the general price level to project outlays for inputs of nonfarm origin. The important items of farm origin--purchased feed, livestock, and seed--are forecast on the basis of prices, number of animals to be fed, acres to be planted, and movement of cattle to feedlots.

The income and expense data are examined for reasonableness and consistency. Price elasticities are analyzed. The relationship of expenses to gross income is examined on the basis of historical patterns and trend data. Net farm income--a residual--is looked at on the basis of the aggregate and income per farm.

A very recent addition to the forecasting effort has been to estimate possible high (price) and low (price) alternatives for farm income. This procedure gives, at the very least, some idea of the probable ranges in income and expense forecasts and residual net incomes.

Coordination

FIR has to coordinate very closely with CED personnel in this effort. A major difficulty in preparing farm income forecasts is the short lead-time between the acquisition of forecasts from CED personnel and the scheduled delivery time for the farm income forecasts. Work is coordinated with the Demand Analysis Unit, which supplies price indexes and the outlook for general price levels. Very little coordination currently exists with the Program Area of Inputs and Finance in the Food and Fiber Sector (IFFFS).

Overall coordination has suffered since the reorganization. It would help if one person were in charge and set the signals. In the Economic and Statistical Analysis Division of the previous organization, there was coordination through the director's office which greatly facilitated this function.

Shortcomings

(1) From the FIR standpoint, it appears to us that there may be some lack of interaction among the commodity analysts. That is, the meat animal and poultry and egg prices should make sense in terms of each other.

(2) Overall review should be sharpened and every exercise should have a designated leader--often it is not clear who is in charge.

(3) The IFFFS program area should take a more active part in short-range forecasting.

(4) Deadlines should be observed, the leadtimes should be adequate to meet deadlines.

(5) Relationships should be further analyzed and forecasts reviewed for bias or invalid assumptions. Also, additional resources could be employed in Sector Performance Measures program area.

(6) Forecasts, if possible, should be put together on the basis of quarterly price and quantity parameters, with the exception of major crops for which quarterly marketings are best made by FIR.

(7) Alternatives should be clear and reasonable and kept to a manageable number. Ranges should be of a reasonable tolerance. Alternative forecasts which vary widely from the expected outlook have a very low probability of occurrence and thus the usefulness may be questionable.

(8) Additional work is needed to strengthen forecasts of production expenses.

(9) Forms should be designed for transmissions of price and quantity data used in forecasting. This would insure uniformity among commodity analysts and help FIR in our wrap-up function.

(10) When possible, the results should be discussed among those involved to avoid any obvious inconsistencies.

(11) Forecasting should not be overdone--too many forecasts create confusion, and one set of numbers becomes too closely interrelated to the other when time intervals are short.

Statement by Analysts in the Inputs and Finance in the
Food and Fiber Sector Program Area

Statement of Current Work

In the program area, Inputs and Finance in the Food and Fiber Sector (IFFFS) of NEAD, the flow of funds project has responsibility for maintaining and improving an econometric model for the farm production subsector known as the Aggregative Income and Wealth (AIW) simulator. One of the uses of the AIW simulator is to forecast the level of capital formation and uses of funds to purchases of real estate assets from discontinuing proprietors in the farm production subsector of the food and fiber sector during the year. The simulator also forecasts how these cash flows of capital are financed. In addition, the AIW simulator provides a forecast of the values of year-end stocks of physical and financial assets and loan funds outstanding in investor's portfolios. These forecasts are published in the Agricultural Finance Outlook.

Forecasts of the AIW simulator are presently made at the national level. Relatively few assumptions are required regarding future movements in the exogenous variables in the system of simultaneous portfolio balancing equations. Ancillary equations for the financial sector and its linkage to the loan funds market serving the farm production subsector as well as many of the other exogenous relationships in the AIW simulator have been estimated by either recursive or ordinary least squares regression where appropriate. The system of simultaneous portfolio balancing equations have been estimated using the two-stage principal components regression technique.

Coordination With Other Units

Forecasts of the financial structure of the farm production subsector, annual capital formation, and other cash flows of capital, and how these flows of capital will be financed over a shortrun forecast horizon, utilize ERS estimates of the indices of prices received for crops and livestock and total farm output. Also utilized in these forecasts, are the estimates of indices of prices paid for specific production inputs, family living expenses, and the dollar amount of direct Government payments. Several of these indices are used in the AIW simulator to determine such flows of funds as cash receipts and the stock of crop and livestock inventories desired at the end of the year.

As described above, estimates of prices and output provided to us by the Economic Projections and Analytical Systems Program Area (EPAS) of NEAD are used to forecast the financial structure and equity position in the farm production subsector, as well as how cash flows of capital will be financed. These price and output estimates are originally provided to NEAD by CED commodity experts.

4/ Material in this section was prepared primarily by John Penson, agricultural economist, NEAD, ERS.

Improvements in Shortrun Forecasting Analysis

Several improvements to the present version of the AIW simulator are planned. Initially, we plan to disaggregate the demand and supply equations for real estate and nonreal estate secured loan funds on an institutional basis. Secondly, the regression coefficients in the AIW simulator will be reestimated to reflect the addition of current data to the post-World War II sample period used to estimate the present AIW simulator. Since several revisions are planned for series on income and expenditure flows published in the Farm Income Situation, affected equations will also be reestimated as this data becomes available.

Data or Forecasts From Other Units

Since there is currently no formal procedure to provide delivery of the price and output estimates or additional data series to those individuals responsible for maintaining and improving the AIW simulator, periodic checks are made with those responsible for maintaining these series in ERS. Information published in the Farm Income Situation and the Balance Sheet of the Farming Sector provide new information to those responsible for maintaining the AIW simulator. Also, as periodic staff requests and Congressional inquiries are received for which the AIW simulator is applicable, checks are made with EPAS Program Area personnel to obtain the latest set of price and output indices available for incorporation into the AIW simulator.

Data and Forecasts Submitted to Other Units

Forecasts, both on a factual and a counterfactual basis, are used in preparing the following reports:

1. Agricultural Finance Outlook.
2. Forecasts used in replying to staff requests and Congressional inquiries.
3. Providing information on target prices received by farmers based upon alternative levels of desired financial well-being such as the subsector's debt repayment capacity (This feature is currently being tested and inserted into the AIW simulator).

Organization and Operation of the Outlook and Situation Board
(ERS General Memorandum No. 60, Revised)

An Outlook and Situation Board was established by the Secretary in Memorandum No. 1139, issued December 12, 1945, defining the functions and organization of the Bureau of Agricultural Economics. The Board was continued by Secretary's Memorandum No. 1446, Supplement No. 1 of April 3, 1961, which established the Economic Research Service. In the present Administrative Regulations of the Department (exhibit 1 - 1 AR 1 Amendment 100 1-22-73), operation of the board has been delegated by the Secretary to the Director of Agricultural Economics who in turn has delegated this authority to the Administrator, Economic Research Service.

The Outlook and Situation Board is responsible for the technical review and approval of all economic situation and outlook reports prepared within Agricultural Economics or by other agencies of the Department. The Chairman of the board shall be designated by the Administrator, Economic Research Service, and the board shall consist of specialists drawn from the Economic Research Service and from other agencies of the Department as appropriate. The membership of the board may vary for different reports or classes of reports. This Memorandum further outlines the organization of the Board and the procedures for its operation.

1. The Outlook and Situation Officer, ERS is designated as Chairman.
2. The Deputy Director, National Economic Analysis Division, ERS, who has responsibility for outlook coordination is designated as vice-chairman.
3. A panel of persons authorized to serve on the board for reports with respect to individual commodities, groups of commodities or subjects shall be established upon agreement between the appropriate Division Director or agency head and the chairman of the board. The persons named should have special knowledge of or interest in the commodity or subject. The membership of the board for considering any given report shall, insofar as practicable, represent the major phases of interest in the subject.
4. The total membership of the Board for reviewing and approving any single report shall consist of at least 5 persons, including either or both the chairman or the vice-chairman.
5. The approval by the board shall constitute all necessary clearance as to technical accuracy.
6. Approval by the majority of the members of the board considering any given report shall constitute approval of the board which shall be indicated by the board members signing the signature sheet for the report. Each report approved by the board shall, when duplicated, bear the statement, "Approved by Outlook and Situation Board _____."

Date

7. The Board shall have a permanent Secretary to keep a record of each report approved by the board, to see that any necessary revisions are incorporated in the approved reports, and to participate as a Board member.

8. In general, situation and outlook reports are those which contain interpretations of a situation, or an outlook statement as to what may be expected in the future. More specifically, these include:

(a) Periodical and special outlook and situation reports prepared in the Economic Research.

(b) Outlook and situation statements appearing in world summaries of crop and livestock statistics and in crop and livestock reports.

(c) All food outlook and situation statements prepared in the Department.

(d) Other regularly issued reports which, after discussion between the head of any agency and the Chairman of the board, are considered to contain significant outlook material.

(e) Any other report containing interpretations of a situation or an outlook statement.

9. All rewrites or summaries of outlook and situation reports such as those appearing in the Agricultural Situation published by the Statistical Reporting Service and those appearing in reviews published by other agencies of the Department, as well as outlook and situation statements in press releases, shall be cleared by the chairman or Secretary of the Board.

10. Information officers of the various agencies of the Department who are responsible for clearing speeches should check outlook materials or analyses in speeches with the Secretary or chairman of the board.

11. Clearance and release of outlook and situation reports.

(a) Outlook and situation reports, approved for publication by the Outlook and Situation Board, are relied upon by agriculture, industry, and government as a source of information for making economic decisions. In many instances, advance notice of the contents of these reports could give a trading advantage to those receiving such notice. The purpose of the following procedures is to preclude premature disclosure.

Summaries of the situation reports approved by the board are for release immediately upon adjournment of the board meeting. This requires thorough preparation and informal review of reports and summaries before Board meetings so as to minimize time devoted to changes during sessions.

(b) The summary of each situation report, including a table of significant data, if appropriate, shall contain the gist of all information in the report that might affect the commodity markets or have widespread public interest. It should not exceed two typewritten pages in length. The summary shall carry a notice of the time the full printed report will be available.

For the Agricultural Outlook Digest, those excerpts that consist of new market sensitive material shall be released in the same manner as summaries. If no such new material is carried in an issue of this digest, no excerpt need be released.

(c) Review copies of reports and summaries will be sent to OSB members and to the Deputy Director, Office of Communication, at least two days in advance of Board meetings. These manuscripts must be edited and as nearly ready for publication as possible. Copies will be marked "For Official Use Only." Recipients or their representatives will sign for the copies.

(d) Information in the review copies not already released may not be disclosed to, or discussed with, unauthorized persons until officially cleared by the OSB. Authors should check before Board meetings with interested panel members on matters likely to be controversial. Board members should thoroughly review reports and come prepared with alternative wording when desiring to make substantive changes.

(e) Each board meeting first will consider clearance of the summary of the report. When the summary has been approved, it will be duplicated under board supervision as quickly as possible and released, upon conclusion of board meeting, to press representatives at Press Service, Office of Communication. Those attending OSB meetings may not communicate with anyone outside the Board room during meetings without explicit approval by the Chairman.

(f) Board meetings for reports dealing with major crops (Wheat, Fats and Oils, Feed, and Cotton) for which information in the report might affect trading on the futures market will be held in the afternoon. No release of the summaries or adjournment of the board will be made until the respective commodity exchanges close. The chairman may schedule other Board meetings including special meetings and release times at his direction.

(g) After the board approves a report and releases the summary, the contents of the report are no longer classified "For Official Use Only."

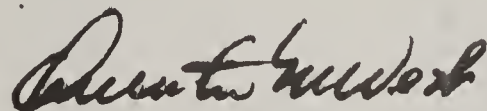
(h) Reports are to be printed and distributed as soon as possible after the board meetings. The printed report will carry a notice of the release time of the summary.

(i) A schedule of Outlook and Situation Board meetings and release dates of the various situation reports will be prepared by the Secretary of the Board in consultation with the situation report authors and the Chairman of the Board. The schedule will be distributed early in the calendar year. The Chairman may modify the proposed schedule or arrange special meetings if necessary.

(j) These procedures apply to the clearance and release of the following outlook and situation reports:

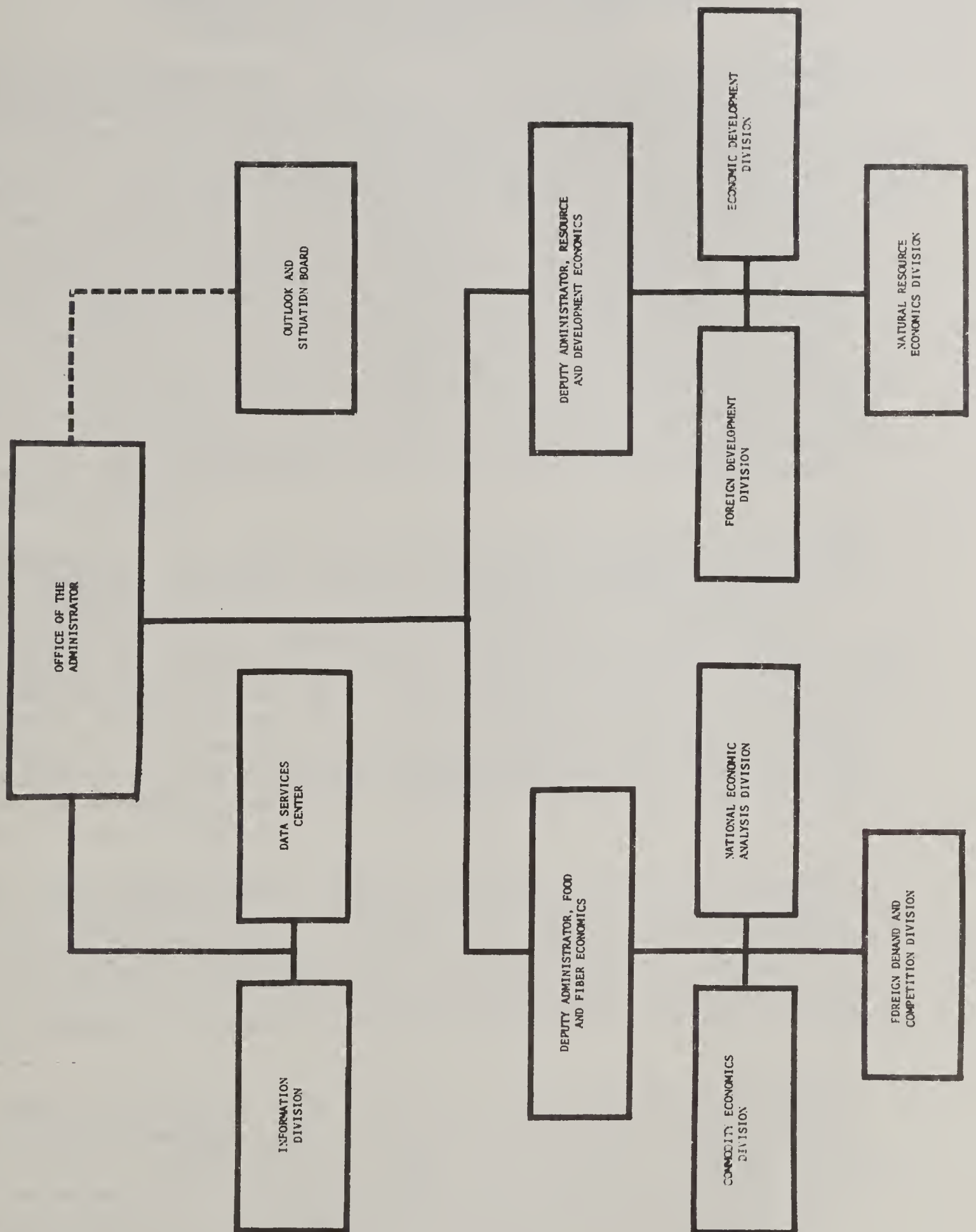
Agricultural Finance
Cotton
Dairy
Demand and Price
Farm Cost
Farm Real Estate
Market Developments
Fats and Oils
Feed
Fertilizer
Fruit

Livestock and Meat
Marketing and Transportation
National Food
Outlook Digest
Poultry and Egg
Rice
Tobacco
Vegetable
Wheat
Wool
World Agricultural Situation



QUENTIN M. WEST
Administrator

ORGANIZATION OF ECONOMIC RESEARCH SERVICE



Interagency Commodity Estimates Committees
(Secretary's Memorandum No. 1769)

1. Departmental Committees. There is a continuing need for estimates and projections of basic data regarding supply, utilization, prices and program effects to be used on a Departmentwide basis for budgetary purposes and for appraising and administering present or proposed programs. In response to this need, Secretary's Memorandum No. 1530, March 15, 1963, authorized establishment of a Departmental committee for each price supported commodity, and others as needed. That Memorandum was revised and superseded by Secretary's Memorandum No. 1614, April 12, 1967, to clarify the operating procedures and specify in more detail the responsibilities assigned. Secretary's Memorandum No. 1674 dated December 1, 1969, was necessitated by the reorganization of the Department with respect to activities relating to export sales and international development, the establishment of a new agency in connection therewith, the Export Marketing Service, the reduction in size of the Staff Economists Group and the reorganization of the Agricultural Stabilization and Conservation Service.

2. Organization. (a) For CCC price supported commodities and major products thereof: Commodity estimates committees shall be composed of one member from each of the following agencies of the Department: Economic Research Service, Export Marketing Service, Agricultural Stabilization and Conservation Service, and Foreign Agricultural Service. Each committee shall be chaired by the ASCS member who shall also act as secretary of the committee. To provide data for budget estimates and other purposes, at least two meetings for the preparation of detailed calculations of program costs and expenditures shall be scheduled each calendar year--around June 1 and November 1. Additional meetings will be scheduled as required.

(b) For other commodities: On each commodity for which the Consumer and Marketing Service, the Food and Nutrition Service or the Export Marketing Service recommends a program, an ad hoc commodity estimates committee shall be established. Each committee shall be chaired by the C&MS member who shall also act as secretary of the committee, and shall be composed of members of appropriate agencies designated above in 2(a).

(c) Committee procedure: The chairman of each committee shall call meetings of his committee and to the extent possible provide members with at least two days' notice of committee meetings. He shall inform committee members of the agenda, making available or requesting background data and other relevant materials previously prepared by the designated agencies for review by the committee. The chairman is empowered to appoint subcommittees.

3. Duties. (a) The committees shall appraise and review basic data and make estimates as a basis for projecting supply, utilization and prices for major commodities, including the effects of new program proposals on acreage, yield, production, imports, domestic utilization, price, price support programs, carryover, exports, and availabilities for export. Estimates agreed to by each committee will be official estimates of the Department regarding the effects of program proposals and changes, but will in no way restrict the formation of special study groups or performance of the duties of any agency of the Department associated with its assigned responsibilities.

(b) The following officials within the Department shall perform the duties and have the responsibilities as set forth below:

(1) The Director of Agricultural Economics shall be the clearinghouse in the Department for economic data, statistics and projections. He has a staff responsibility to see that the economic resources of all appropriate agencies in the Department are drawn upon in connection with economic policy decisions. Proposed decisions involving substantial economic policy implications shall be checked with him. At least two times each year (when detailed calculations of program costs and expenditures are required) he shall provide committee chairmen with basic assumptions and background data regarding the overall economy and parity price projections for specific commodities.

(2) The Administrator of the Economic Research Service shall provide the commodity estimates committees with basic data and economic analyses for their consideration relating to acreage, yield, production, utilization, foreign trade, and supply and price estimates for each commodity.

(3) The Administrator of the Foreign Agricultural Service, coordinating with the Consumer and Marketing Service and the Export Marketing Service, shall provide the commodity estimates committees for their consideration with estimates of total exports and imports for each commodity.

(4) The Administrator of the Consumer and Marketing Service, in connection with programs administered by C&MS, shall supply the Foreign Agricultural Service with estimates of program exports and shall supply the commodity estimates committees directly with data regarding domestic program operations for which C&MS has jurisdiction.

(5) The General Sales Manager of the Export Marketing Service shall supply FAS and commodity estimates committees with basic data and estimates of programmed exports under PL-480 and of commercial exports under other programs administered by the EMS.

(6) The Administrator of the Agricultural Stabilization and Conservation Service shall supply the commodity estimates committees with data and analyses relating to the quantities and value of each commodity placed under price support, repayments, acquisitions, and dispositions under existing and proposed programs, including program exports of tobacco, peanuts, tung oil, and gum naval stores.

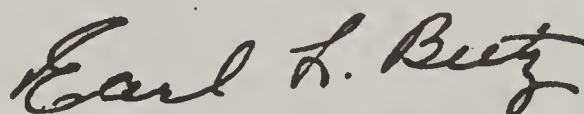
(7) The Administrator of the Food and Nutrition Service shall supply the commodity estimates committees directly with data regarding domestic program operations for which FNS has jurisdiction.

Personnel from the Statistical Reporting Service shall, upon request, consult with and supply data to these committees.

4. Utilization of Estimates. Estimates of these interagency committees shall be used in (a) development of budgets and (b) the development, appraisal, and administration of programs. The estimates shall serve as the basis for published statements, material provided the Congress, and testimony before the Congressional committees. Financial data or estimates prepared by these committees shall be furnished the Director of Budget and Finance. Committee members shall be responsible for providing their respective administrators with appraisals and reports prepared by the committees. All such material shall be identified as having been prepared by a particular committee.

5. Utilization of Committees. Requests for committee assistance shall be routed through the Administrator, ASCS, or the Administrator, C&MS, whichever agency provides the committee chairman. Such requests may be initiated by an agency head within the Department, or by the Office of the Secretary.

6. Prior Memorandum Superseded. With this issuance, Secretary's Memorandum No. 1674 dated December 1, 1969, is hereby superseded.


Secretary of Agriculture

7

UNITED STATES DEPARTMENT OF AGRICULTURE

OFFICE OF THE SECRETARY

WASHINGTON, D. C. 20250

September 16, 1974

SECRETARY'S MEMORANDUM NO. 1769, REVISED

Interagency Commodity Estimates Committees

1. Departmental Committees. There is a continuing need for estimates and projections of basic data regarding supply, utilization, prices, and program effects to be used on a Departmentwide basis for program planning and budgeting purposes and for evaluating and administering present or proposed programs. In response to this need, this Secretary's Memorandum authorizes establishment of Departmental committees for each price supported agricultural commodity, and others as needed.

2. Organization. (a) For CCC price supported commodities and major products thereof: commodity estimates committees shall be composed of one member from each of the following agencies of the Department: Economic Research Service, Agricultural Stabilization and Conservation Service, and Foreign Agricultural Service. Each committee shall be chaired by the ASCS member who shall also act as the secretary of the committee. A representative of the Office of Planning and Evaluation will attend all committee meetings as an observer.

(b) For other commodities: whenever the Director of Agricultural Economics determines a need, he may after consultation with Agricultural Marketing Service, the Food and Nutrition Service, the Foreign Agricultural Service, or any other agency that operates programs affecting the supply and utilization of these commodities establish a commodity estimates committee. Each committee shall be composed of members of ERS and other agencies as designated by the Director of Agricultural Economics. Each committee shall be chaired by the ERS member who shall also act as secretary of the committee. A representative of the Office of Planning and Evaluation will attend all committee meetings as an observer.

(c) Committee procedure: the chairman of each committee shall call meetings of his committee and, to the extent possible, provide members and the Office of Planning and Evaluation with at least two days notice of committee meetings. He shall inform committee members and the Office of Planning and Evaluation of the agenda, making

available or requesting background data and other relevant materials previously prepared by the designated agencies for review by the committee. The chairman is empowered to appoint subcommittees.

3. Duties. (a) The committees shall appraise and review basic data and make estimates of projected supply, utilization, and prices for commodities, including the effects of new program proposals on acreage, yield, production, imports, domestic utilization, price, price support programs, carryover, exports, and availabilities for export. Meetings shall be held as needed for developing budget estimates, analyzing program changes, evaluating the effects of crop reports and other purposes.

(b) The following officials within the Department shall perform the duties and have the responsibilities as set forth below:

(1) The Director of Agricultural Economics has been delegated the authority to coordinate all economic analysis and review all decisions involving substantial economics policy implications. Therefore, proposed decisions made by commodity estimates committees shall be reviewed by him prior to any release outside the Department. Whenever necessary he shall provide committee chairmen with basic assumptions, background data, and other relevant data regarding the overall economy and market prospects for specific commodities.

(2) The Administrator of the Economic Research Service shall provide the commodity estimates committees with basic data and economic analyses for their consideration relating to acreage, yield, production, utilization, foreign trade, and supply and price estimates for each commodity.

(3) The Administrator of the Foreign Agricultural Service, coordinating with the Economic Research Service and the Agricultural Marketing Service, shall provide the commodity estimates committees, for their consideration, with estimates of total exports and imports for each commodity, including exports programmed under P. L. 480 and other export programs administered by FAS.

(4) The Administrator of the Agricultural Marketing Service, in connection with programs administered by AMS shall supply the Foreign Agricultural Service with estimates of program exports and shall supply the commodity estimates committees directly with data regarding domestic program operations for which AMS

has jurisdiction.

(5) The Administrator of the Agricultural Stabilization and Conservation Service shall supply the commodity estimates committees with data and analyses relating to the quantities and value of each commodity placed under price support, repayments, acquisitions and dispositions under existing and proposed programs, including program exports of tobacco, peanuts, tung oil, and gum naval stores.

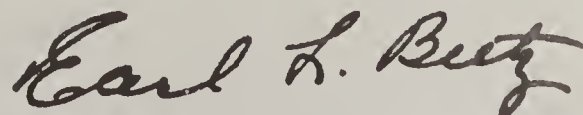
(6) The Administrator of the Food and Nutrition Service shall supply the commodity estimates committees directly with data regarding domestic program operations for which F&NS has jurisdiction.

Personnel from the Statistical Reporting Service shall, upon request, consult with and supply data to, these committees.

4. Utilization of Estimates. Estimates of these interagency committees shall be used in (a) development of budgets and (b) the development, administration, and evaluation of programs. The projections with the approval of the Director of Agricultural Economics shall become the official estimates of the Department and shall serve as the basis for published statements, material provided the Congress, and testimony before the Congressional committees.

5. Utilization of Committees. Requests for committee assistance shall be routed through the Administrator, ASCS, or the Administrator, ERS, whichever agency provides the committee chairman. Such requests may be initiated by an agency head within the Department, or by the Office of the Secretary. This in no way restricts the formation of special study groups or performance of the duties of any agency of the Department associated with its assigned responsibilities.

6. Prior Memorandum Revised. With this issuance, Secretary's Memorandum No. 1769, Revised, dated March 21, 1972, is hereby revised.


Secretary of Agriculture

APPENDIX C -- SUMMARY OF MODELS USED IN FORECASTING EVALUATION

Wheat Model

The econometric demand framework employed in reviewing the 1972/73 wheat marketing year was developed in the Economic Research Service. This framework is the current version of earlier systems used to describe the important interrelationships in the wheat sector. The basic model includes eight structural equations, consisting of six behavioral relationships and two identities. The period of analysis included the 1960/61 - 1971/72 marketing year (July-June).

The structural equations were estimated using ordinary least squares. Important relationships include those for five major wheat utilization categories: food use, feed use, seed use, exports and Ending stocks. A sixth equation, describing the season of average price received by farmers for wheat, is based on a non-linear relationship between a 3 year moving average of U.S. wheat food use and ending wheat stocks. The wheat export relationship considers wheat supplies in three major exporting countries (Argentina, Australia, and Canada), as well as total grain production in the remainder of the world. Feed use estimates are based primarily on the wheat/sorghum price ratio and cattle on feed in the western States.

The equations of the model and variable identification are summarized below. Statistical measures for the equations include: (1) t values-- shown in parentheses below the regression coefficients; (2) R^2 -- the coefficient of determination; (3) s.e.--standard error of estimate; and (4) D.W.--Durbin-Watson statistic. Exogenous variables are designated with an asterisk (*) above the variable name in each equation.

Variable Identification

Endogenous

AQF	=	Wheat food use, 3 year average; million bushels
PWSA	=	Season average wheat price (July-June) dollars/bushels
QEXP	=	Wheat exports (commercial and government assisted); million bushels
QF	=	Wheat food use; million bushels
QFE	=	Wheat feed use; million bushels
QSE	=	Wheat seed use; million bushels
TESK	=	Ending wheat stocks (private and government carryover); million bushels
TQEXP	=	Total wheat exports (QEXP + additional exports (EXSHIF)); million bushels

TWS = Total wheat supply (carryin (TESK-1) + production (TWP));
million bushels

Exogenous

AWP = Wheat acres planted; million

COFW = Cattle on feed, July 1, 10 western States; 1,000 head

CPIF = Consumer price index, food; 1967 = 100

EXSHIF = Additional wheat exports, million bushels

MC = Value of millers wheat certificate; dollars/bushels

POP = Population, July 1, 50 States; million

PSOR3 = Sorghum price, July-September; dollar/cwt.

TGPRW = Grain production in world excluding U.S., Australia,
Argentina, and Canada; million metric tons

TM = Time trend

TWP = Wheat production; million bushels

TWSMC = Wheat supply in Australia, Argentina, and Canada;
million bushels

Summary of Equations

Total Wheat Supply

$$(1) \quad TWS = TESK_{-1}^* + TWP$$

Wheat Food Demand

Current year:

$$(2) \quad QF = 329.7 - 16.149 [PWSA + MC]^* + 1.002 POP^* + 0.18 CPIF^*$$

(2.5) (5.9) (0.9)

$$R^2 = .95 \quad s.e. = 3.56 \quad D.W. = 2.47$$

3-year average:

$$(3) \quad AQF = [QF_{-2} + QF_{-1} + QF] \div 3$$

Wheat Price

$$(4) \quad PWSA = 1.277 + 0.165 [AQF \div TESK]^5$$

(8.4)

$$R^2 = .91 \quad s.e. = .06 \quad D.W. = 1.06$$

Wheat Feed Demand

$$(5) \quad QFE = 28.94 + 0.043 \overset{*}{COFW} - 66.867 \{1.667 [PWSA - \overset{*}{PSOR3}] \}$$

(3.0) (1.6)

$$R^2 = .92 \quad s.e. = 27.3 \quad D.W. = 2.36$$

Wheat Seed Use

$$(6) \quad QSE = 3.199 + 1.083 \overset{*}{AWP}_{t+1}$$

(51.2)

$$R^2 = .99 \quad s.e. = .87 \quad D.W. = 1.45$$

Wheat Exports

$$(7) \quad QEXP = -203224.48 - .211 \overset{*}{TWSMC} - 4.601 \overset{*}{TGPRW} + 105.53 \overset{*}{TM}$$

(1.8) (3.5) (3.2)

$$R^2 = .70 \quad s.e. = 65.4 \quad D.W. = 1.93$$

Total Wheat Exports

$$(8) \quad TQEXP = QEXP + \overset{*}{EXSHIF}$$

Total Ending Wheat Stocks

$$(9) \quad TESK = TWS - QF - QFE - QSE - TQEXP$$

Semiannual Beef and Pork Models

The model utilized in this report is composed of 12 behavioral relationships plus 3 identities. Individual models for the beef and pork sectors are defined. Within the model retail price relationships for turkeys and broilers are included to convert forecasts of the supplies of competing poultry products into price predictions. The structures of the beef and pork models contain relationships to explain production, ending stocks, civilian consumption, retail prices, and farm prices. The model used in this analysis was estimated through use of ordinary least squares. The sample data used for estimation consisted of 24 observations for the period 1960-71.

The estimated relationships and associated statistics (R^2 , Durbin-Watson, t-ratios in parentheses) are presented below. Following the equations is a list which identifies the variables. Endogenous variables are identified by a dagger (†) on the variable name.

Beef Model Equations

(1) Quantity of Beef Produced

$$QBFP = 112.58 + 354.34 BCI2 - 189.58 [BCI - BCI1] - 282.43 PC$$

(16.75) (1.21) (.95)

$$-398.03 PC1 - 83.91 PBFF + 77.28 PBFF1 - 73.14 SDS$$

(1.3) (2.25) (2.10) (.70)

$$R^2 = .9822$$

$$D.W. = 1.81$$

(2) Ending Stocks of Beef

$$ESBF = -170.77 - 10.47 PBFR + 10.47 PBFR1 + .0489 QBFP - 64.0 SDS$$

(2.53) (2.53) (6.65) (3.82)

$$R^2 = .701$$

$$D.W. = 1.79$$

(3) Civilian Consumption of Beef (Identity)

$$CBF = QBFP + BSBF + NIBF - ESBF - GPBF - MPBF$$

(4) Retail Price of Beef

$$PBFR = 57.91 - .00962 CBF + 154.54 DPI + .0613 PPKR + .942 PBRR$$

(8.95) (14.44) (.80) (4.20)

$$- 2.12 SDS$$

(3.33)

$$R^2 = .9788$$

$$D.W. = 1.40$$

(5) Farm Price of Beef

$$PBFF = -13.7023 + .4038 PBFR - .00153 [QBFP - QBFP1] - 3.127 WMP$$

(7.96) (3.46) (1.79)

$$+ .202 T$$

(1.27)

$$R^2 = .96983$$

$$D.W. = 1.40$$

Pork Model Equations

(6) Number of Sows Farrowed

$$\text{NSWF} = - .8961 + .7828 \text{ SDS} - .0096 \text{ SDS T} + .7383 \text{ NSWF2}$$

(4.45) (3.14) (7.81)

$$+ .1186 \left[\text{PPKF1/PC2} \right] + .1378 \left[\text{PPKF2/PC2} \right]$$

(4.44) (.28)

$$R^2 = .92464$$

(7) Number of Hogs Slaughtered

$$\text{NHGS} = - 72.19 + .0317 \text{ PPKF} + 4.005 \text{ NSWF1} + 3.007 \text{ NSWF2}$$

(.33) (7.40) (5.52)

$$+ 9.57034 \text{ P/L1}$$

(3.13)

$$R^2 = .8358$$

$$\text{D.W.} = 1.46$$

(8) Average Weight of Hogs Slaughtered

$$\text{AWHGS} = 24.12 + .43 \left\{ \frac{\text{PPKF}}{.85\text{PC} + .15\text{PSM}} \right\} + .415 \text{ AWHGS1} + .89028 \text{ RT}^{1/}$$

(2.74) (2.42) (2.85)

$$R^2 = .9765$$

(9) Quantity of Pork Produced

$$\text{QPKP} = \text{NHGS} \times \text{AWHGS}$$

(10) Ending Stocks of Pork

$$\text{ESPK} = - 183.43 - 4.975 \text{ PPKR} + 4.9475 \text{ PPKR1} + .0708 \text{ QPKP}$$

(2.20) (2.20) (3.26)

$$+ 39.46 \text{ SDS}$$

(2.23)

$$R^2 = .648$$

$$\text{D.W.} = 1.29$$

1/ RT refers to a restricted trend variable where T is held constant after reaching a particular level.

(11) Commercial Consumption of Pork

$$CPK = QPKP + BSPK + NIPK - ESPK - GPPK - MPPK$$

(12) Retail Price of Pork

$$\begin{aligned} PPKR = & 79.35 - .0145 CPK + .0324 PBFR + .4669 PBRR + .1199 PTKR \\ & (14.39) \quad (.24) \quad (2.12) \quad (1.24) \\ & + 95.524 DPI - 3.97 SDS - 3.97 RSDS^{2/} \\ & (14.99) \quad (6.85) \end{aligned}$$

$$R^2 = .980$$

$$D.W. = 1.59$$

(13) Farm Price of Pork

$$\begin{aligned} PPKF = & 13.246 + .555 PPKR - .00207 [QPKP - QPKP1] - .45809 T \\ & (15.25) \quad (4.34) \quad (4.88) \end{aligned}$$

$$R^2 = .9524$$

$$D.W. = .80$$

Broiler Model Equations^{3/}

(14) Retail Price of Broilers

$$\begin{aligned} \frac{PBRR}{CPI} = & .1435 - .000022 \left[\frac{CBRR}{POP} \right] + .1493 \left[\frac{PPKR}{CPI} \right] + .2256 \left[\frac{PBFR}{CPI} \right] + .1959 \left[\frac{PTKR}{CPI} \right] \\ & (4.2) \quad (1.20) \quad (2.61) \quad (1.70) \\ & + 49.05 \left[\frac{DPI}{CPI} \right] \\ & (5.54) \end{aligned}$$

$$R^2 = .975$$

$$D.W. = 1.92$$

Turkey Model Equations^{3/}

(15) Retail Price of Turkey

$$\begin{aligned} \left[\frac{PTKR}{DPI} \right] = & 18.06 - .11678 SDS \times CTKI - .0383 OSDS \times CTKI1 + .18896 \left[\frac{PPKR}{DPI} \right] \\ & (1.94) \quad (2.03) \quad (.97) \\ & + .58153 \left[\frac{PBFR}{DPI} \right] \\ & (3.89) \end{aligned}$$

$$R^2 = .94$$

$$D.W. = .96$$

^{2/} The RSDS variable represents an externally estimated seasonal intercept adjustment.

^{3/} The retail price relationships for broilers and turkeys were developed and estimated by Randolph Zeitner, mathematical statistician, NEAD, ERS.

Variable Legend

QBFP [†]	=	Current quantity of beef produced, farm plus commercial (million lbs.)
BCI	=	Beef cow inventory, Jan. 1 and estimated July 1 (million head)
BCI1	=	Beef cow inventory lagged 6 months (million head)
BCI2	=	Beef cow inventory lagged 1 year (million head)
PC	=	Current price received by farmers for corn (¢/lb.)
PC1	=	Price received by farmers for corn lagged 6 months (¢/lb.)
PBFF [†]	=	Current weighted price of slaughter cattler at Omaha, Nebraska (\$/cwt.)
PBFF1	=	Weighted price of slaughtered cattle at Omaha, lagged 6 months (\$/cwt.)
SDS	=	Seasonal dummy shifter (binary)
ESBF [†]	=	Ending stocks of beef in cold storage (million lbs.)
PBFR [†]	=	Current retail price of beef (¢/lb.)
PBFR1	=	Retail price of beef lagged 6 months (¢/lb.)
CBF [†]	=	Civilian consumption of beef (million lbs.)
BSBF	=	Beginning stocks of beef or ending stocks of beef lagged 6 months (million lbs.)
NIBF	=	Net imports of beef (million lbs.)
GPBF	=	Government purchases of beef (million lbs.)
MPBF	=	Military purchases of beef (million lbs.)
DPI	=	Disposable personal income (trillion \$)
PPKR [†]	=	Retail price of pork (¢/lbs.)
QBFP1	=	Quantity of beef produced lagged 6 months (million lbs.)
WMP	=	Wages of meatpackers (\$/hour)
T	=	Trend variable
NSWF [†]	=	Number of sows farrowed (million head)
PBRR	=	Retail price of broilers (¢/lbs.)

NSWF1 = Number of sows farrowed, lagged 6 months (million head)
 NSWF2 = Number of sows farrowed, lagged 1 year (million head)
 PPKF[†] = Price of barrows and gilts at eight markets (\$/cwt.)
 PPKF1 = Price of barrows and gilts at eight markets, lagged 6 months (\$/cwt.)
 PPKF2 = Price of barrows and gilts at eight markets, lagged 1 year (\$/cwt.)
 PC2 = Price of corn, lagged 1 year (¢/lb.)
 P/L1 = Pigs saved per litter, lagged 6 months (head)
 NHGS[†] = Number of hogs slaughtered (million head)
 AWHGS[†] = Average weight of hogs slaughtered (lbs./head)
 AWHGS1[†] = Average weight of hogs slaughtered, lagged 6 months (lbs./head)
 PSM = Price of soybean meal (¢/lb.)
 QPKP[†] = Quantity of pork produced, farm plus commercial production (million lbs.)
 QPKP1 = Quantity of pork produced lagged 6 months (million lbs.)
 PPKR1 = Retail price of pork lagged 6 months (¢/lb.)
 ESPK[†] = Ending stocks of pork in cold storage (million lbs.)
 CPK[†] = Civilian consumption of pork (million lbs.)
 BSPK = Beginning stocks of pork or ending stocks of pork lagged 6 months (million lbs.)
 NIPK = Net imports of pork (million lbs.)
 GPPK = Government purchases of pork (million lbs.)
 MPPK = Military purchases of pork (million lbs.)
 PTKR = Retail price of turkey (¢/lb.)
 CPI = Consumer price index less food
 CBR = Commercial consumption of broilers (million lbs.)
 POP = Population of U.S. (billion people)

- CTKI = Commercial consumption of turkey, first half of year
(million lbs.)
- OSDS = Reverse seasonal dummy shifter (SDS), zero first half
and 1-second half
- CTKI1 = Commercial consumption of turkey--second half of year
(million lbs.)

APPENDIX D --ERS QUARTERLY FORECAST RECORDS

A Guide to the Forecast Records and Associated Statistical Measures

General Format. The following sections contain tables which were generated by a computer program for evaluating the accuracy of quarterly forecasts. The individual forecasted items are grouped in appropriate categories to facilitate summary comparisons. For each forecasted item there are two tables. The first table presents the forecasted item values and the computed values for the Theil-U. The second is a two-part table that shows the percentage error and revision ratio computed from the first table. Following this set of tables in each category is a pair of tables summarizing the computed percentage error, revisions ratio, and Theil-U values. Descriptions of these measures are given in the following paragraphs. Subsequently, other aspects relevant to using specific tables are covered.

Percentage Errors. The percentage by which an individual forecast is below or above the reported value for the corresponding quarter is a common performance criterion. In the summary tables the average and range of this measure are given in absolute terms. Also note that the percentage of under-and overestimates are based only on the relative number of such occurrences--they are not weighted by size of error.

Revision Ratio. Theil's revision ratio, also known as Theil's R statistic, measures whether or not a successive forecast of a given event is an improvement over an earlier one.^{1/} The general expression for any two forecasts F_j following F_i with an actual outcome of A is written as

$$R_{i \cdot j} = \frac{F_j - F_i}{A - F_i}.$$

For instance, R1.4 is the revision ratio between a first

and a fourth forecast of the price for a given commodity for a given quarter. The evaluation utilizes the following classification of revision ratios.

- $0 < R < 2$: A successful revision; F_j is closer to A than F_i is to A;
- $0 < R < 1$: A successful revision, but the revision was too small;
- $1 < R < 2$: A successful revision, but the revision was too large;
- $R = 1$: A perfect revision, $F_j = A$;
- $R > 2; R > 0$: An unsuccessful revision; F_j is farther from A than F_i is from A; and $R < 0$ means the revision was in the wrong direction.

^{1/} Theil, Henry Economic Forecasts and Policy, North-Holland Pub. Co., Amsterdam, 2nd revised ed., 1961, p.62.

The summary tables contain distributions of these ratios that approximate the above categories.

Theil-U Statistic. A Theil inequality coefficient, also known as a Theil-U statistic, is computed according to the following formula:^{2/}

$$U = \sqrt{\frac{\sum_{t=5}^T (P_t^r - A_t)^2}{\sum_{t=5}^T (A_t)^2}}$$

where the P_t^r are predicted changes and the A_t are realized changes, defined as:

$$A_t = a_t - a_{t-4}$$

$$P_t^r = p_t^r - a_{t-4}$$

and where a_t is the realized outcome for a variable in quarter t and p_t^r is the r^{th} forecast of a_t ($t=5, \dots, T$; $r=1, \dots, 4$). This statistic is computed for each forecast attempt for each forecasted item. That is, a Theil U is computed for each set of first forecasts, each set of second forecasts, and so on.

The numerator of this statistic is, in fact, the sum of squared prediction errors. This is also the variable component of both the mean square prediction error and the standard error of the forecast. Thus, several mathematically equivalent interpretations can be given to the Theil-U criterion. The basic assumption underlying this measure is that the decision rule in which the forecast information is used leads to a quadratic loss function.

However, the properties of this statistic do provide a simple comparative evaluation of a given forecasting procedure. Its values lie along the zero to infinity half-line with the lower bound being reached if and only if all forecasts are perfect. Furthermore, a value of unity would result if one were to use a naive no-change predictor. In other words, the predicted value is equal to the previous actual value for the same quarter, a year earlier. Thus, if a Theil-U of less than 1.0 is obtained, it means that the prediction method used has a smaller standard error of forecast than that of the simple no-change extrapolation. Conversely, if the statistic is greater than 1.0, it would have been better to use the naive method, according to the standard error of forecast criterion.

^{2/} Theil, Henri, Applied Economic Forecasting, North-Holland, Pub. Co., Amsterdam, 1966, p.28.

Timing of Forecasts. The track record of forecasted values generally contains four forecasts and a reported or final value for each quarter. An individual forecast is denoted as a first, second, third, or fourth forecast according to the time at which the specific value was prepared relative to the forecasted quarter. Though the timing is not readily apparent from the information provided by the tabled values, it can be quickly ascertained once the reader becomes familiar with the table format. This format is illustrated in the following partial table, using the year 1970 as an example, where the forecasted values are replaced by the approximate dates the forecasts would have been made.

-----Forecast-----					
Year	Quarter	1st	2nd	3rd	4th
1970	1	April 69	July 69	Oct. 69	Jan. 70
1970	2	July 69	Oct. 69	Jan. 70	April 70
1970	3	Oct. 69	Jan. 70	April 70	July 70
1970	4	Jan. 70	April 70	July 70	Oct. 70

Approximately, first forecasts are made 9 months in advance; second forecasts, 6 months in advance; third forecasts, 3 months in advance and fourth forecasts are made in the beginning of the given quarter. Forecasts are typically prepared quarterly for the following four quarters. The general rule is that these are made about the middle of the first month of each calendar quarter.

The forecast record is set up in this fashion even though there are exceptions to this general procedure. For example, the initial forecast for a first quarter is sometimes made in the preceding July. In this case, because of the timing and the table format, this initial forecast would show as second forecast and asterisks would be entered in the first forecast position of the table.

Data Format Considerations. The following sections include tables containing forecasts and realized or reported values for a number of items for which forecasts are made. Most of these consist of individual crop and livestock prices and price forecasts for which the reported or realized values are an unweighted average of the three monthly prices for a given calendar quarter. The monthly prices are those estimated by SRS and are computed by weighting state prices by estimated monthly sales. All forecasts are for calendar quarters. Forecasts initially prepared by crop year and crop quarter were appropriately converted to calendar quarter.

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TABLE A-1-- FORECAST EVALUATION OF PRICE RECEIVED BY FARMERS FOR ALL COMMODITIES (1910-14=100)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - - F O R E C A S T - - - - - *

YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	238.000	245.000	253.000	269.000
1966	2	238.000	241.000	249.000	258.000	265.000
1966	3	244.000	250.000	252.000	262.000	272.000
1966	4	245.000	245.000	257.000	262.000	260.000
1967	1	*****	254.000	262.000	261.000	253.000
1967	2	254.000	261.000	260.000	251.000	252.000
1967	3	258.000	259.000	255.000	256.000	256.000
1967	4	260.000	256.000	257.000	252.000	253.000
1968	1	*****	260.000	254.000	256.000	257.000
1968	2	259.000	251.000	254.000	261.000	260.000
1968	3	257.000	260.000	266.000	264.000	264.000
1968	4	255.000	260.000	262.000	258.000	262.000
1969	1	*****	261.000	256.000	259.000	266.000
1969	2	261.000	257.000	258.000	264.000	276.000
1969	3	259.000	260.000	264.000	282.000	277.000
1969	4	257.000	258.000	278.000	272.000	281.000
1970	1	*****	275.000	271.000	282.000	289.000
1970	2	274.000	270.000	279.000	284.000	280.000
1970	3	275.000	279.000	282.000	282.000	280.000
1970	4	275.000	274.000	268.000	275.000	270.000
1971	1	*****	270.000	278.000	272.000	281.000
1971	2	272.000	276.000	273.000	282.000	284.000
1971	3	280.000	278.000	283.000	287.000	283.000
1971	4	274.000	280.000	282.000	280.000	290.000
1972	1	281.000	288.000	288.000	294.000	307.000
1972	2	292.000	291.000	294.000	299.000	312.000
1972	3	288.000	295.000	301.000	318.000	325.000
1972	4	291.000	297.000	308.000	320.000	337.000
1973	1	*****	312.000	320.000	350.000	384.000
1973	2	314.000	319.000	338.000	371.000	418.000
1973	3	317.000	330.000	356.000	433.000	484.000
1973	4	322.000	336.000	427.000	459.000	466.000
1974	1	*****	419.000	465.000	504.000	502.000
1974	2	415.000	442.000	501.000	477.000	443.000
1974	3	427.000	480.000	468.000	463.000	459.000
1974	4	440.000	436.000	454.000	468.000	462.000

THEIL-U 1.049 0.913
NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

0.666

0.322

TABLE A-2-- FORECAST EVALUATION OF PRICE RECEIVED BY FARMERS FOR ALL COMMODITIES (1910-14=100)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

* - - - - P E R C E N T E R R O R - - - - *						* - - - - R E V I S I O N R A T I O - - - - *				
YEAR	QUARTER	1ST	2ND	3RD	4TH	R1.2	R1.3	R1.4	R2.3	R3.4
1966	1	*****	-11.52	-8.92	-5.95	*****	*****	*****	0.23	0.33
1966	2	-10.19	-9.06	-6.04	-2.64	0.11	0.41	0.74	0.33	0.56
1966	3	-10.29	-8.09	-7.35	-3.68	0.21	0.29	0.64	0.09	0.50
1966	4	-5.77	-5.77	-1.15	0.77	0.0	0.80	1.13	0.80	1.67
1967	1	*****	0.40	3.56	3.16	*****	*****	*****	-8.00	0.11
1967	2	0.79	3.57	3.17	-0.40	-3.50	-3.00	1.50	0.11	1.13
1967	3	0.78	1.17	-0.39	0.0	-0.50	1.50	1.00	1.33	1.00
1967	4	2.77	1.19	1.58	-0.40	0.57	0.43	1.14	-0.33	1.25
1968	1	*****	1.17	-1.17	-0.39	*****	*****	*****	2.00	0.67
1968	2	-0.38	-3.46	-2.31	0.38	-8.00	-5.00	2.00	0.33	1.17
1968	3	-2.65	-1.52	0.76	0.0	0.43	1.29	1.00	1.50	1.00
1968	4	-2.67	-0.76	0.0	-1.53	0.71	1.00	0.43	1.00	-400.00
1969	1	*****	-1.88	-3.76	-2.63	*****	*****	*****	-1.00	0.30
1969	2	-5.43	-6.88	-6.52	-4.35	-0.27	-0.20	0.20	0.05	0.33
1969	3	-6.50	-6.14	-4.69	1.81	0.06	0.28	1.28	0.24	1.38
1969	4	-8.54	-8.19	-1.07	-3.20	0.04	0.88	0.63	0.87	-2.00
1970	1	*****	-4.84	-6.23	-2.42	*****	*****	*****	-0.29	0.61
1970	2	-2.14	-3.57	-0.36	1.43	-0.67	0.83	1.67	0.90	5.00
1970	3	-1.79	-0.36	0.71	0.71	0.80	1.40	1.40	3.00	0.0
1970	4	1.85	1.48	-0.74	1.85	0.20	1.40	0.0	1.50	3.50
1971	1	*****	-3.91	-1.07	-3.20	*****	*****	*****	0.73	-2.00
1971	2	-4.23	-2.82	-3.87	-0.70	0.33	0.08	0.83	-0.38	0.82
1971	3	-1.06	-1.77	0.0	1.41	-0.67	1.00	2.33	1.00	400.00
1971	4	-5.52	-3.45	-2.76	-3.45	0.38	0.50	0.38	0.20	-0.25
1972	1	-8.47	-6.19	-6.19	-4.23	0.27	0.27	0.50	0.0	0.32
1972	2	-6.41	-6.73	-5.77	-4.17	-0.05	0.10	0.35	0.14	0.28
1972	3	-11.38	-9.23	-7.38	-2.15	0.19	0.35	0.81	0.20	0.71
1972	4	-13.65	-11.87	-8.61	-5.04	0.13	0.37	0.63	0.27	0.41
1973	1	*****	-18.75	-16.67	-8.85	*****	*****	*****	0.11	0.47
1973	2	-24.88	-23.68	-19.14	-11.24	0.05	0.23	0.55	0.19	0.41
1973	3	-34.50	-31.82	-26.45	-10.54	0.08	0.23	0.69	0.17	0.60
1973	4	-30.90	-27.90	-8.37	-1.50	0.10	0.73	0.95	0.70	0.82
1974	1	*****	-16.53	-7.37	0.40	*****	*****	*****	0.55	1.05
1974	2	-6.32	-0.23	13.09	7.67	0.96	3.07	2.21	59.00	0.41
1974	3	-6.97	4.58	1.96	0.87	1.66	1.28	1.13	0.57	0.56
1974	4	-4.76	-5.63	-1.73	1.30	-0.18	0.64	1.27	0.69	1.75

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

TABLE A-3-- FORECAST EVALUATION OF PRICE RECEIVED BY FARMERS FOR ALL CROPS (1910-14=100)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - - F O R E C A S T - - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	220.000	222.000	225.000	232.000
1966	2	224.000	220.000	222.000	230.000	239.000
1966	3	212.000	214.000	216.000	227.000	244.000
1966	4	209.000	210.000	219.000	227.000	230.000
1967	1	*****	224.000	228.000	229.000	225.000
1967	2	223.000	227.000	230.000	225.000	226.000
1967	3	213.000	214.000	218.000	216.000	223.000
1967	4	211.000	219.000	217.000	218.000	231.000
1968	1	*****	220.000	221.000	232.000	230.000
1968	2	224.000	221.000	232.000	238.000	233.000
1968	3	220.000	231.000	232.000	227.000	228.000
1968	4	223.000	224.000	223.000	221.000	225.000
1969	1	*****	223.000	218.000	223.000	221.000
1969	2	228.000	227.000	229.000	227.000	225.000
1969	3	221.000	222.000	219.000	224.000	215.000
1969	4	219.000	214.000	219.000	216.000	217.000
1970	1	*****	220.000	218.000	223.000	219.000
1970	2	223.000	219.000	225.000	224.000	225.000
1970	3	218.000	216.000	218.000	224.000	230.000
1970	4	213.000	214.000	216.000	229.000	228.000
1971	1	*****	220.000	232.000	234.000	239.000
1971	2	224.000	235.000	241.000	244.000	248.000
1971	3	229.000	231.000	236.000	244.000	237.000
1971	4	225.000	229.000	234.000	233.000	242.000
1972	1	*****	241.000	240.000	245.000	248.000
1972	2	251.000	251.000	251.000	250.000	257.000
1972	3	239.000	243.000	246.000	252.000	263.000
1972	4	238.000	240.000	242.000	255.000	274.000
1973	1	*****	246.000	256.000	288.000	302.000
1973	2	254.000	262.000	277.000	303.000	353.000
1973	3	249.000	263.000	287.000	357.000	408.000
1973	4	253.000	261.000	323.000	402.000	419.000
1974	1	*****	323.000	405.000	467.000	485.000
1974	2	325.000	393.000	467.000	469.000	456.000
1974	3	356.000	435.000	432.000	460.000	486.000
1974	4	379.000	384.000	446.000	504.000	504.000

THEIL-U 1.212 0.964 0.635 0.261

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

TABLE A-4--FORECAST EVALUATION OF PRICE RECEIVED BY FARMERS FOR ALL CROPS (1910-14=100)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	R1.2	R1.3	R1.4	R2.3	R3.4
1966	1	*****	-5.17	-4.31	-3.02	*****	*****	*****	0.17	0.30
1966	2	-6.28	-7.95	-7.11	-3.77	-0.27	-0.13	0.40	0.11	0.47
1966	3	-13.11	-12.30	-11.48	-6.97	0.06	0.13	0.47	0.07	0.39
1966	4	-9.13	-8.70	-4.78	-1.30	0.05	0.48	0.86	0.45	0.73
1967	1	*****	-0.44	1.33	1.78	*****	*****	*****	4.00	-0.33
1967	2	-1.33	0.44	1.77	-0.44	1.33	2.33	0.67	-3.00	1.25
1967	3	-4.48	-4.04	-2.24	-3.14	0.10	0.50	0.30	0.44	-0.40
1967	4	-8.66	-5.19	-6.06	-5.63	0.40	0.30	0.35	-0.17	0.07
1968	1	*****	-4.35	-3.91	0.87	*****	*****	*****	0.10	1.22
1968	2	-3.86	-5.15	-0.43	2.15	-0.33	0.89	1.56	0.92	6.00
1968	3	-3.51	1.32	1.75	-0.44	1.38	1.50	0.88	-0.33	1.25
1968	4	-0.89	-0.44	-0.89	-1.78	0.50	0.0	-1.00	-1.00	-1.00
1969	1	*****	0.90	-1.36	0.90	*****	*****	*****	2.50	1.67
1969	2	1.33	0.89	1.78	0.89	0.33	-0.33	0.33	-1.00	0.50
1969	3	2.79	3.26	1.86	4.19	-0.17	0.33	-0.50	0.43	-1.25
1969	4	0.92	-1.38	0.92	-0.46	2.50	0.0	1.50	1.67	1.50
1970	1	*****	0.46	-0.46	1.83	*****	*****	*****	2.00	5.00
1970	2	-0.89	-2.67	0.0	-0.44	-2.00	1.00	0.50	1.00	-100.00
1970	3	-5.22	-6.09	-5.22	-2.61	-0.17	0.0	0.50	0.14	0.50
1970	4	-6.58	-6.14	-5.26	0.44	0.07	0.20	1.07	0.14	1.08
1971	1	*****	-7.95	-2.93	-2.09	*****	*****	*****	0.63	0.29
1971	2	-9.68	-5.24	-2.82	-1.61	0.46	0.71	0.83	0.46	0.43
1971	3	-3.38	-2.53	-0.42	2.95	0.25	0.88	1.88	0.83	8.00
1971	4	-7.02	-5.37	-3.31	-3.72	0.24	0.53	0.47	0.38	-0.13
1972	1	*****	-2.82	-3.23	-1.21	*****	*****	*****	-0.14	0.63
1972	2	-2.33	-2.33	-2.33	-2.72	0.0	0.0	-0.17	0.0	-0.17
1972	3	-9.13	-7.60	-6.46	-4.18	0.17	0.29	0.54	0.15	0.35
1972	4	-13.14	-12.41	-11.68	-6.93	0.06	0.11	0.47	0.06	0.41
1973	1	*****	-18.54	-15.23	-4.64	*****	*****	*****	0.18	0.70
1973	2	-28.05	-25.78	-21.53	-14.16	0.08	0.23	0.49	0.16	0.34
1973	3	-38.97	-35.54	-29.66	-12.50	0.09	0.24	0.68	0.17	0.58
1973	4	-39.62	-37.71	-22.91	-4.06	0.05	0.42	0.90	0.39	0.82
1974	1	*****	-33.40	-16.49	-3.71	*****	*****	*****	0.51	0.77
1974	2	-28.73	-13.82	2.41	2.85	0.52	1.08	1.10	1.17	-0.18
1974	3	-26.75	-10.49	-11.11	-5.35	0.61	0.58	0.80	-0.06	0.52
1974	4	-24.80	-23.81	-11.51	0.0	0.04	0.54	1.00	0.52	1.00

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

TABLE A-5-- FORECAST EVALUATION OF PRICE RECEIVED BY FARMERS FOR LIVESTOCK & PRODUCTS (1910-14=100)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - - F O R E C A S T - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	253.000	264.000	278.000	300.000
1966	2	250.000	258.000	272.000	282.000	287.000
1966	3	272.000	280.000	283.000	292.000	296.000
1966	4	275.000	276.000	289.000	291.000	286.000
1967	1	*****	281.000	292.000	289.000	277.000
1967	2	280.000	289.000	286.000	273.000	275.000
1967	3	296.000	298.000	286.000	290.000	284.000
1967	4	302.000	289.000	292.000	281.000	273.000
1968	1	*****	293.000	283.000	276.000	280.000
1968	2	290.000	277.000	273.000	282.000	283.000
1968	3	290.000	285.000	295.000	295.000	295.000
1968	4	282.000	291.000	295.000	289.000	294.000
1969	1	*****	293.000	288.000	291.000	304.000
1969	2	289.000	283.000	283.000	297.000	321.000
1969	3	293.000	292.000	303.000	333.000	331.000
1969	4	289.000	295.000	329.000	320.000	335.000
1970	1	*****	323.000	317.000	333.000	348.000
1970	2	318.000	313.000	325.000	336.000	327.000
1970	3	323.000	333.000	338.000	333.000	323.000
1970	4	328.000	326.000	312.000	315.000	305.000
1971	1	*****	313.000	317.000	305.000	316.000
1971	2	314.000	311.000	300.000	315.000	315.000
1971	3	323.000	317.000	323.000	324.000	321.000
1971	4	316.000	323.000	322.000	320.000	332.000
1972	1	*****	328.000	329.000	337.000	357.000
1972	2	327.000	324.000	331.000	341.000	358.000
1972	3	329.000	340.000	349.000	374.000	378.000
1972	4	337.000	346.000	365.000	376.000	390.000
1973	1	*****	368.000	375.000	403.000	454.000
1973	2	366.000	369.000	391.000	429.000	474.000
1973	3	376.000	387.000	415.000	498.000	551.000
1973	4	382.000	400.000	517.000	508.000	507.000
1974	1	*****	501.000	513.000	535.000	518.000
1974	2	492.000	484.000	530.000	484.000	432.000
1974	3	489.000	518.000	499.000	466.000	435.000
1974	4	491.000	482.000	461.000	437.000	427.000
THEIL-U		0.928	0.850	0.692	0.356	

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

TABLE A-6-- FORECAST EVALUATION OF PRICE RECEIVED BY FARMERS FOR LIVESTOCK & PRODUCTS (1910-14=100)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	R1.2	R1.3	R1.4	R2.3	R3.4
1966	1	*****	-15.67	-12.00	-7.33	*****	*****	*****	0.23	0.39
1966	2	-12.89	-10.10	-5.23	-1.74	0.22	0.59	0.86	0.48	0.67
1966	3	-8.11	-5.41	-4.39	-1.35	0.33	0.46	0.83	0.19	0.69
1966	4	-3.85	-3.50	1.05	1.75	0.09	1.27	1.45	1.30	-0.67
1967	1	*****	1.44	5.42	4.33	*****	*****	*****	-2.75	0.20
1967	2	1.82	5.09	4.00	-0.73	-1.80	-1.20	1.40	0.21	1.18
1967	3	4.23	4.93	0.70	2.11	-0.17	0.83	0.50	0.86	-2.00
1967	4	10.62	5.86	6.96	2.93	0.45	0.34	0.72	-0.19	0.58
1968	1	*****	4.64	1.07	-1.43	*****	*****	*****	0.77	2.33
1968	2	2.47	-2.12	-3.53	-0.35	1.86	2.43	1.14	-0.67	0.90
1968	3	-1.69	-3.39	0.0	0.0	-1.00	1.00	1.00	1.00	0.0
1968	4	-4.08	-1.02	0.34	-1.70	0.75	1.08	0.58	1.33	6.00
1969	1	*****	-3.62	-5.26	-4.28	*****	*****	*****	-0.45	0.19
1969	2	-9.97	-11.84	-11.84	-7.48	-0.19	-0.19	0.25	0.0	0.37
1969	3	-11.48	-11.78	-8.46	0.60	-0.03	0.26	1.05	0.28	1.07
1969	4	-13.73	-11.94	-1.79	-4.48	0.13	0.87	0.67	0.85	-1.50
1970	1	*****	-7.18	-8.91	-4.31	*****	*****	*****	-0.24	0.52
1970	2	-2.75	-4.28	-0.61	2.75	-0.56	0.78	2.00	0.86	5.50
1970	3	0.0	3.10	4.64	3.10	1000.00	1500.00	1000.00	-0.50	0.33
1970	4	7.54	6.89	2.30	3.28	0.09	0.70	0.57	0.67	-0.43
1971	1	*****	-0.95	0.32	-3.48	*****	*****	*****	1.33	12.00
1971	2	-0.32	-1.27	-4.76	0.0	-3.00	-14.00	1.00	-2.75	1.00
1971	3	0.62	-1.25	0.62	0.93	3.00	0.0	-0.50	1.50	-0.50
1971	4	-4.82	-2.71	-3.01	-3.61	0.44	0.38	0.25	-0.11	-0.20
1972	1	*****	-8.12	-7.84	-5.60	*****	*****	*****	0.03	0.29
1972	2	-8.66	-9.50	-7.54	-4.75	-0.10	0.13	0.45	0.21	0.37
1972	3	-12.96	-10.05	-7.67	-1.06	0.22	0.41	0.92	0.24	0.86
1972	4	-13.59	-11.28	-6.41	-3.59	0.17	0.53	0.74	0.43	0.44
1973	1	*****	-18.94	-17.40	-11.23	*****	*****	*****	0.08	0.35
1973	2	-22.78	-22.15	-17.51	-9.49	0.03	0.23	0.58	0.21	0.46
1973	3	-31.76	-29.76	-24.68	-9.62	0.06	0.22	0.70	0.17	0.61
1973	4	-24.65	-21.10	1.97	0.20	0.14	1.08	1.01	1.09	0.90
1974	1	*****	-3.28	-0.97	3.28	*****	*****	*****	0.71	4.40
1974	2	13.89	12.04	22.69	12.04	0.13	-0.63	0.13	-0.88	0.47
1974	3	12.41	19.08	14.71	7.13	-0.54	-0.19	0.43	0.23	0.52
1974	4	14.99	12.88	7.96	2.34	0.14	0.47	0.84	0.38	0.71

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table A-7--FORECAST EVALUATION: DISTRIBUTION OF REVISION RATIOS, PRICE RECEIVED BY FARMERS FOR ALL COMMODITIES, ALL CROPS AND LIVESTOCK AND PRODUCTS

* - - - - PERCENTAGE OF R STATISTICS - - - - *									
	.01- 1.99	.01- .99	1.00- 1.99	OVER 1.99	UNDER 0.00	0.00	TOTAL		
R1.2									
PRICE RECEIVED BY FARMERS FOR ALL COMMODITIES (1910-14=100)	67.86	64.29	3.57	0.0	28.57	3.57	100.00		
PRICE RECEIVED BY FARMERS FOR ALL CROPS (1910-14=100)	74.07	66.67	7.41	3.70	18.52	3.70	100.00		
PRICE RECEIVED BY FARMERS FOR LIVESTOCK & PRODUCTS (1910-14=100)	59.26	55.56	3.70	7.41	33.33	0.0	100.00		
* * * FORECAST TOTAL * *	67.07	62.20	4.88	3.66	26.83	2.44	100.00		
R1.3									
PRICE RECEIVED BY FARMERS FOR ALL COMMODITIES (1910-14=100)	85.71	60.71	25.00	3.57	10.71	0.0	100.00		
PRICE RECEIVED BY FARMERS FOR ALL CROPS (1910-14=100)	74.07	62.96	11.11	3.70	7.41	14.81	100.00		
PRICE RECEIVED BY FARMERS FOR LIVESTOCK & PRODUCTS (1910-14=100)	70.37	55.56	14.81	7.41	18.52	3.70	100.00		
* * * FORECAST TOTAL * *	76.83	59.76	17.07	4.88	12.20	6.10	100.00		
R1.4									
PRICE RECEIVED BY FARMERS FOR ALL COMMODITIES (1910-14=100)	85.71	50.00	35.71	10.71	0.0	3.57	100.00		
PRICE RECEIVED BY FARMERS FOR ALL CROPS (1910-14=100)	88.89	66.67	22.22	0.0	11.11	0.0	100.00		
PRICE RECEIVED BY FARMERS FOR LIVESTOCK & PRODUCTS (1910-14=100)	88.89	62.96	25.93	7.41	3.70	0.0	100.00		
* * * FORECAST TOTAL * *	87.80	59.76	28.05	6.10	4.88	1.22	100.00		
R2.3									
PRICE RECEIVED BY FARMERS FOR ALL COMMODITIES (1910-14=100)	75.00	61.11	13.89	8.33	13.89	2.78	100.00		
PRICE RECEIVED BY FARMERS FOR ALL CROPS (1910-14=100)	69.44	61.11	8.33	8.33	19.44	2.78	100.00		
PRICE RECEIVED BY FARMERS FOR LIVESTOCK & PRODUCTS (1910-14=100)	72.22	55.56	16.67	0.0	25.00	2.78	100.00		
* * * FORECAST TOTAL * *	72.22	59.26	12.96	5.56	19.44	2.78	100.00		
R3.4									
PRICE RECEIVED BY FARMERS FOR ALL COMMODITIES (1910-14=100)	77.78	52.78	25.00	8.33	11.11	2.78	100.00		
PRICE RECEIVED BY FARMERS FOR ALL CROPS (1910-14=100)	69.44	50.00	19.44	8.33	22.22	0.0	100.00		
PRICE RECEIVED BY FARMERS FOR LIVESTOCK & PRODUCTS (1910-14=100)	66.67	58.33	8.33	13.89	16.67	2.78	100.00		
* * * FORECAST TOTAL * *	71.30	53.70	17.59	10.19	16.67	1.85	100.00		

Table A-8-- FORECAST EVALUATION: SUMMARY OF PERCENT ERROR AND THEIL-U STATISTIC FOR PRICES RECEIVED BY FARMERS FOR ALL COMMODITIES, ALL CROPS AND LIVESTOCK AND PRODUCTS.

	*-- -- -- AVERAGE	PERCENT RANGE	ERROR	-- -- -- UNDER- EST. %	OVER- EST. %	THEIL-U
FORECAST PERIOD 1						
PRICE RECEIVED BY FARMERS FOR ALL COMMODITIES (1910-14=100)	7.91	0.38	34.50	85.71	14.29	1.049
PRICE RECEIVED BY FARMERS FOR ALL CROPS (1910-14=100)	11.13	0.89	39.62	88.89	11.11	1.212
PRICE RECEIVED BY FARMERS FOR LIVESTOCK & PRODUCTS (1910-14=100)	9.51	0.0	31.76	62.96	33.33	0.928
FORECAST PERIOD 2						
PRICE RECEIVED BY FARMERS FOR ALL COMMODITIES (1910-14=100)	7.11	0.23	31.82	80.56	19.44	0.913
PRICE RECEIVED BY FARMERS FOR ALL CROPS (1910-14=100)	8.96	0.44	37.71	83.33	16.67	0.964
PRICE RECEIVED BY FARMERS FOR LIVESTOCK & PRODUCTS (1910-14=100)	8.56	0.95	29.76	72.22	27.78	0.850
FORECAST PERIOD 3						
PRICE RECEIVED BY FARMERS FOR ALL COMMODITIES (1910-14=100)	5.30	0.0	26.45	75.00	19.44	0.666
PRICE RECEIVED BY FARMERS FOR ALL CROPS (1910-14=100)	6.30	0.0	29.66	77.78	19.44	0.635
PRICE RECEIVED BY FARMERS FOR LIVESTOCK & PRODUCTS (1910-14=100)	6.52	0.0	24.68	55.56	41.67	0.692
FORECAST PERIOD 4						
PRICE RECEIVED BY FARMERS FOR ALL COMMODITIES (1910-14=100)	2.90	0.0	11.24	61.11	33.33	0.322
PRICE RECEIVED BY FARMERS FOR ALL CROPS (1910-14=100)	3.21	0.0	14.16	69.44	27.78	0.261
PRICE RECEIVED BY FARMERS FOR LIVESTOCK & PRODUCTS (1910-14=100)	3.73	0.0	12.04	55.56	38.89	0.356

TABLE B-1--FORECAST EVALUATION OF FARM PRICE OF WHEAT (DOL/BU.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - F O R E C A S T - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	1.350	1.350	1.370	1.420
1966	2	1.280	1.330	1.340	1.360	1.470
1966	3	1.330	1.340	1.360	1.600	1.720
1966	4	1.370	1.400	1.650	1.650	1.600
1967	1	1.400	1.500	1.550	1.530	1.550
1967	2	1.400	1.400	1.450	1.500	1.540
1967	3	1.250	1.250	1.500	1.300	1.390
1967	4	1.300	1.600	1.350	1.400	1.400
1968	1	*****	1.350	1.420	1.410	1.410
1968	2	1.400	1.390	1.380	1.380	1.320
1968	3	1.370	1.370	1.370	1.320	1.200
1968	4	1.400	1.400	1.350	1.250	1.270
1969	1	*****	1.370	1.270	1.250	1.280
1969	2	1.390	1.300	1.250	1.250	1.260
1969	3	1.250	1.220	1.220	1.220	1.190
1969	4	1.280	1.280	1.280	1.290	1.290
1970	1	*****	1.300	1.300	1.300	1.290
1970	2	1.250	1.250	1.290	1.270	1.290
1970	3	1.220	1.220	1.220	1.230	1.320
1970	4	1.300	1.300	1.300	1.450	1.430
1971	1	*****	1.350	1.500	1.500	1.400
1971	2	1.250	1.400	1.400	1.350	1.430
1971	3	1.300	1.350	1.320	1.280	1.290
1971	4	1.400	1.370	1.300	1.280	1.320
1972	1	*****	1.320	1.300	1.330	1.340
1972	2	1.270	1.270	1.300	1.300	1.360
1972	3	1.220	1.270	1.270	1.280	1.520
1972	4	1.320	1.320	1.310	1.650	2.080
1973	1	*****	1.320	1.600	2.200	2.140
1973	2	1.290	1.550	1.750	1.770	2.240
1973	3	1.400	1.550	1.700	2.500	3.850
1973	4	1.630	1.600	2.300	4.300	4.400
1974	1	*****	2.000	4.150	4.950	5.260
1974	2	1.800	3.700	4.300	3.900	3.690
1974	3	3.000	3.400	3.500	3.800	4.200
1974	4	2.900	3.250	3.500	4.800	4.790
THEIL-U		1.269	1.065	0.745	0.324	

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-2--FORECAST EVALUATION OF FARM PRICE OF WHEAT (DOL/BU.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	* - - - - R E V I S I O N R A T I O - - - *			
		R1.2	R1.3	R1.4	R2.3	R3.4			
1966	1	*****	*****	*****	*****	*****	0.0	0.29	
1966	2	-12.93	0.32	0.42	0.07	0.15			
1966	3	-22.67	0.08	0.69	0.05	0.67			
1966	4	-14.38	1.22	1.22	1.25	0.0			
1967	1	-9.68	1.00	0.87	1.00	-2.00			
1967	2	-9.09	0.36	0.71	0.36	0.56			
1967	3	-10.07	1.79	0.36	1.79	1.82			
1967	4	-7.14	0.50	1.00	1.25	1.00			
1968	1	*****	*****	*****	*****	*****	1.17	1.00	
1968	2	6.06	0.25	0.25	0.14	0.0			
1968	3	14.17	0.0	0.29	0.0	0.29			
1968	4	10.24	0.38	1.15	0.38	1.25			
1969	1	*****	*****	*****	*****	*****	1.11	-2.00	
1969	2	10.32	1.08	1.08	1.25	0.0			
1969	3	5.04	0.50	0.50	0.0	0.0			
1969	4	-0.78	0.0	1.00	0.0	1.00			
1970	1	*****	*****	*****	*****	*****	0.0	0.0	
1970	2	-3.10	1.00	0.50	1.00	-2.00			
1970	3	-7.58	0.0	0.10	0.0	0.10			
1970	4	-9.09	0.0	1.15	0.0	1.15			
1971	1	*****	*****	*****	*****	*****	3.00	0.0	
1971	2	-12.59	0.83	0.56	0.0	-1.67			
1971	3	0.78	-2.00	2.00	0.50	1.33			
1971	4	6.06	1.25	1.50	1.40	-1.00			
1972	1	*****	*****	*****	*****	*****	-1.00	0.75	
1972	2	-6.62	0.33	0.33	0.33	0.0			
1972	3	-19.74	0.17	0.20	0.0	0.04			
1972	4	-36.54	-0.01	0.43	-0.01	0.44			
1973	1	*****	*****	*****	*****	*****	0.34	1.11	
1973	2	-42.41	0.48	0.51	0.29	0.04			
1973	3	-63.64	0.12	0.45	0.07	0.37			
1973	4	-62.95	0.24	0.96	0.25	0.95			
1974	1	*****	*****	*****	*****	*****	0.66	0.72	
1974	2	-51.22	1.32	1.11	-60.00	0.66			
1974	3	-28.57	0.42	0.67	0.13	0.43			
1974	4	-39.46	0.32	1.01	0.16	1.01			

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-3--FORECAST EVALUATION OF FARM PRICE OF RYE (DOL/BU.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - - F O R E C A S T - - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	1.050	0.980	0.960	0.970
1966	2	1.000	0.950	0.950	0.950	0.980
1966	3	0.950	0.940	0.940	0.940	1.070
1966	4	0.950	0.950	0.970	0.970	1.050
1967	1	0.940	0.950	0.950	1.000	0.990
1967	2	0.970	0.970	0.990	1.000	1.080
1967	3	0.900	0.900	0.960	1.000	1.060
1967	4	0.920	1.000	1.020	1.060	1.050
1968	1	*****	1.050	1.060	1.030	0.985
1968	2	1.100	1.050	1.040	1.020	1.040
1968	3	1.040	1.040	1.040	1.040	0.969
1968	4	1.060	1.060	1.060	1.020	1.030
1969	1	*****	0.990	1.000	0.920	0.988
1969	2	1.020	1.060	0.980	1.020	1.080
1969	3	0.970	0.970	0.970	0.970	0.966
1969	4	1.000	1.000	1.000	1.000	1.000
1970	1	*****	0.980	0.980	0.980	0.932
1970	2	1.060	1.060	1.060	1.020	1.030
1970	3	0.980	0.980	0.970	0.970	0.931
1970	4	1.050	1.050	1.050	0.950	0.984
1971	1	*****	0.980	1.000	1.020	0.933
1971	2	1.050	1.050	1.050	1.020	1.030
1971	3	0.950	0.950	0.950	0.860	0.840
1971	4	0.980	0.980	0.900	0.880	0.838
1972	1	*****	0.920	0.900	0.860	0.826
1972	2	0.900	0.950	0.910	0.900	0.914
1972	3	0.850	0.850	0.850	0.850	0.910
1972	4	0.890	0.890	0.910	0.950	0.994
1973	1	*****	0.890	0.950	0.950	0.966
1973	2	0.850	1.000	1.000	1.000	1.119
1973	3	0.900	0.850	0.850	0.900	1.750
1973	4	0.890	0.890	0.940	1.800	2.170
1974	1	*****	0.950	1.600	2.250	2.680
1974	2	1.000	1.400	1.600	1.800	1.910
1974	3	1.300	1.500	1.600	2.000	2.520
1974	4	1.400	1.400	1.600	2.650	2.710
THEIL-U		1.327	1.132	0.927	0.455	

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-4--FORECAST EVALUATION OF FARM PRICE OF RYE (DOL/BU.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	* - - - - R E V I S I O N				R A T I O - - -			
						R1.2	R1.3	R1.4	R2.3	R3.4			
1966	1	*****	8.25	1.03	-1.03	*****	*****	*****	0.88	2.00			
1966	2	2.04	-3.06	-3.06	-3.06	2.50	2.50	2.50	0.0	0.0			
1966	3	-11.21	-12.15	-12.15	-12.15	-0.08	-0.08	-0.08	0.0	0.0			
1966	4	-9.52	-9.52	-7.62	-7.62	0.0	0.20	0.20	0.20	0.0			
1967	1	-5.05	-4.04	-4.04	1.01	0.20	0.20	1.20	0.0	1.25			
1967	2	-10.19	-10.19	-8.33	-7.41	0.0	0.18	0.27	0.18	0.11			
1967	3	-15.09	-15.09	-9.43	-5.66	0.0	0.37	0.62	0.37	0.40			
1967	4	-12.38	-4.76	-2.86	0.95	0.62	0.77	1.08	0.40	1.33			
1968	1	*****	6.60	7.61	4.57	*****	*****	*****	-0.15	0.40			
1968	2	5.77	0.96	0.0	-1.92	0.83	1.00	1.33	1.00	-2.00			
1968	3	7.33	7.33	7.33	7.33	0.0	0.0	0.0	0.0	0.0			
1968	4	2.91	2.91	2.91	-0.97	0.0	0.0	1.33	0.0	1.33			
1969	1	*****	0.20	1.21	-6.88	*****	*****	*****	-5.00	6.67			
1969	2	-5.56	-1.85	-9.26	-5.56	0.67	-0.67	0.0	-4.00	0.40			
1969	3	0.41	0.41	0.41	0.41	0.0	0.0	0.0	0.0	0.0			
1969	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
1970	1	*****	5.15	5.15	5.15	*****	*****	*****	0.0	0.0			
1970	2	2.91	2.91	2.91	-0.97	0.0	0.0	1.33	0.0	1.33			
1970	3	5.26	5.26	4.19	4.19	0.0	0.20	0.20	0.20	0.0			
1970	4	6.71	6.71	6.71	-3.46	0.0	0.0	1.52	0.0	1.52			
1971	1	*****	5.04	7.18	9.32	*****	*****	*****	-0.43	-0.30			
1971	2	1.94	1.94	1.94	-0.97	0.0	0.0	1.50	0.0	1.50			
1971	3	13.10	13.10	13.10	2.38	0.0	0.0	0.82	0.0	0.82			
1971	4	16.95	16.95	7.40	5.01	0.0	0.56	0.70	0.56	0.32			
1972	1	*****	11.38	8.96	4.12	*****	*****	*****	0.21	0.54			
1972	2	-1.53	3.94	-0.44	-1.53	3.57	0.71	0.0	1.11	-2.50			
1972	3	-6.59	-6.59	-6.59	-6.59	0.0	0.0	0.0	0.0	0.0			
1972	4	-10.46	-10.46	-8.45	-4.43	0.0	0.19	0.58	0.19	0.48			
1973	1	*****	-7.87	-1.66	-1.66	*****	*****	*****	0.79	0.0			
1973	2	-24.04	-10.63	-10.63	-10.63	0.56	0.56	0.56	0.0	0.0			
1973	3	-48.57	-51.43	-51.43	-48.57	-0.06	-0.06	0.0	0.0	0.06			
1973	4	-58.99	-58.99	-56.68	-17.05	0.0	0.04	0.71	0.04	0.70			
1974	1	*****	-64.55	-40.30	-16.04	*****	*****	*****	0.38	0.60			
1974	2	-47.64	-26.70	-16.23	-5.76	0.44	0.66	0.88	0.39	0.65			
1974	3	-48.41	-40.48	-36.51	-20.63	0.16	0.25	0.57	0.10	0.43			
1974	4	-48.34	-48.34	-40.96	-2.21	0.0	0.15	0.95	0.15	0.95			

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-5--FORECAST EVALUATION OF FARM PRICE OF RICE (DOL/CWT.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - - F O R E C A S T - - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	4.650	4.950	5.050	5.170
1966	2	4.750	4.800	5.000	5.000	5.100
1966	3	4.600	4.800	4.800	4.850	5.010
1966	4	4.950	5.000	5.000	5.000	5.060
1967	1	5.100	5.150	5.150	5.150	5.150
1967	2	5.100	5.100	5.100	5.200	5.160
1967	3	4.900	4.900	4.850	4.800	4.840
1967	4	5.000	4.950	4.950	4.950	5.070
1968	1	*****	5.050	5.000	5.100	5.280
1968	2	5.150	5.100	5.200	5.350	5.360
1968	3	4.850	4.800	4.850	4.800	5.100
1968	4	4.950	5.050	4.900	5.200	5.010
1969	1	*****	5.100	5.250	5.000	4.790
1969	2	5.250	5.350	5.100	4.800	4.830
1969	3	5.000	5.000	4.800	4.800	4.780
1969	4	5.150	4.850	4.850	4.850	5.090
1970	1	*****	4.900	4.900	5.000	4.990
1970	2	4.950	4.950	5.050	5.050	5.030
1970	3	4.850	4.900	5.000	5.100	5.050
1970	4	5.000	5.100	5.150	5.150	5.170
1971	1	*****	5.200	5.200	5.200	5.370
1971	2	5.250	5.250	5.250	5.200	5.280
1971	3	5.000	5.000	5.000	5.000	5.240
1971	4	5.200	5.200	5.200	5.200	5.340
1972	1	*****	5.300	5.300	5.350	5.560
1972	2	5.150	5.150	5.250	5.470	5.580
1972	3	5.250	5.200	5.300	5.400	5.760
1972	4	5.300	5.400	5.500	6.500	7.380
1973	1	*****	5.600	6.600	7.000	8.070
1973	2	5.600	6.750	6.500	6.750	8.510
1973	3	5.500	6.250	6.250	6.850	11.670
1973	4	6.000	6.000	6.350	11.150	15.500
1974	1	*****	6.100	9.350	15.000	16.630
1974	2	6.100	8.000	12.000	14.500	16.870
1974	3	7.000	10.000	12.500	12.000	12.340
1974	4	11.000	11.500	10.000	10.750	10.620

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-6--FORECAST EVALUATION OF FARM PRICE OF RICE (DOL/CWT.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	PERCENT ERROR				REVISION				RATIO		
		1ST	2ND	3RD	4TH	R1.2	R1.3	R1.4	R2.3	R3.4		
1966	1	*****	-10.06	-4.26	-2.32	*****	*****	*****	0.58	0.45		
1966	2	-6.86	-5.88	-1.96	-1.96	0.14	0.71	0.71	0.67	0.0		
1966	3	-8.18	-4.19	-4.19	-3.19	0.49	0.49	0.61	0.0	0.24		
1966	4	-2.17	-1.19	-1.19	-1.19	0.45	0.45	0.45	0.0	0.0		
1967	1	-0.97	0.0	0.0	0.0	1.00	1.00	1.00	0.0	0.0		
1967	2	-1.16	-1.16	-1.16	0.78	0.0	0.0	1.67	0.0	1.67		
1967	3	1.24	1.24	0.21	-0.83	0.0	0.83	1.67	0.83	5.00		
1967	4	-1.38	-2.37	-2.37	-2.37	-0.71	-0.71	-0.71	0.0	0.0		
1968	1	*****	-4.36	-5.30	-3.41	*****	*****	*****	-0.22	0.36		
1968	2	-3.92	-4.85	-2.99	-0.19	-0.24	0.24	0.95	0.38	0.94		
1968	3	-4.90	-5.88	-4.90	-5.88	-0.20	0.0	-0.20	0.17	-0.20		
1968	4	-1.20	0.80	-2.20	3.79	1.67	-0.83	4.17	3.75	2.73		
1969	1	*****	6.47	9.60	4.38	*****	*****	*****	-0.48	0.54		
1969	2	8.70	10.77	5.59	-0.62	-0.24	0.36	1.07	0.48	1.11		
1969	3	4.60	4.60	0.42	0.42	0.0	0.91	0.91	0.91	0.0		
1969	4	1.18	-4.72	-4.72	-4.72	5.00	5.00	5.00	0.0	0.0		
1970	1	*****	-1.80	-1.80	0.20	*****	*****	*****	0.0	1.11		
1970	2	-1.59	-1.59	0.40	0.40	0.0	1.25	1.25	1.25	0.0		
1970	3	-3.96	-2.97	-0.99	0.99	0.25	0.75	1.25	0.67	2.00		
1970	4	-3.29	-1.35	-0.39	-0.39	0.59	0.88	0.88	0.71	0.0		
1971	1	*****	-3.17	-3.17	-3.17	*****	*****	*****	0.0	0.0		
1971	2	-0.57	-0.57	-0.57	-1.52	0.0	0.0	-1.67	0.0	-1.67		
1971	3	-4.58	-4.58	-4.58	-4.58	0.0	0.0	0.0	0.0	0.0		
1971	4	-2.62	-2.62	-2.62	-2.62	0.0	0.0	0.0	0.0	0.0		
1972	1	*****	-4.68	-4.68	-3.78	*****	*****	*****	0.0	0.19		
1972	2	-7.71	-7.71	-5.91	-1.97	0.0	0.23	0.74	0.23	0.67		
1972	3	-8.85	-9.72	-7.99	-6.25	-0.10	0.10	0.29	0.18	0.22		
1972	4	-28.18	-26.83	-25.47	-11.92	0.05	0.10	0.58	0.05	0.53		
1973	1	*****	-30.61	-18.22	-13.26	*****	*****	*****	0.40	0.27		
1973	2	-34.20	-20.68	-23.62	-20.68	0.40	0.31	0.40	-0.14	0.12		
1973	3	-52.87	-46.44	-46.44	-41.30	0.12	0.12	0.22	0.0	0.11		
1973	4	-61.29	-61.29	-59.03	-28.06	0.0	0.04	0.54	0.04	0.52		
1974	1	*****	-63.32	-43.78	-9.80	*****	*****	*****	0.31	0.78		
1974	2	-63.84	-52.58	-29.87	-14.05	0.18	0.55	0.78	0.45	0.51		
1974	3	-43.27	-18.96	1.30	-2.76	0.56	1.03	0.94	1.07	3.13		
1974	4	3.58	8.29	-5.84	1.22	-1.32	2.63	0.66	1.70	1.21		

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

TABLE B-7-- FORECAST EVALUATION OF FARM PRICE OF CORN (DOL/RU.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - - F O R E C A S T - - - - - *

YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	1.100	1.050	1.100	1.190
1966	2	1.150	1.100	1.140	1.130	1.200
1966	3	1.130	1.140	1.120	1.220	1.320
1966	4	1.030	1.030	1.100	1.200	1.280
1967	1	1.140	1.180	1.250	1.320	1.270
1967	2	1.240	1.280	1.340	1.300	1.260
1967	3	1.250	1.250	1.300	1.200	1.150
1967	4	1.100	1.250	1.100	1.050	1.020
1968	1	*****	1.150	1.080	1.050	1.050
1968	2	1.100	1.120	1.100	1.090	1.070
1968	3	1.150	1.140	1.140	1.060	1.010
1968	4	1.100	1.100	1.020	0.960	1.020
1969	1	*****	1.060	1.020	1.080	1.090
1969	2	1.100	1.070	1.100	1.110	1.160
1969	3	1.080	1.120	1.120	1.170	1.170
1969	4	1.050	1.050	1.100	1.100	1.090
1970	1	*****	1.130	1.140	1.140	1.130
1970	2	1.170	1.180	1.180	1.150	1.180
1970	3	1.180	1.180	1.160	1.220	1.300
1970	4	1.070	1.070	1.100	1.280	1.330
1971	1	*****	1.130	1.300	1.420	1.430
1971	2	1.180	1.340	1.440	1.420	1.410
1971	3	1.320	1.400	1.360	1.320	1.220
1971	4	1.300	1.250	1.150	0.980	1.020
1972	1	*****	1.180	1.010	1.060	1.090
1972	2	1.200	1.050	1.080	1.120	1.140
1972	3	1.080	1.100	1.120	1.140	1.170
1972	4	1.120	1.050	1.080	1.130	1.270
1973	1	*****	1.130	1.150	1.330	1.370
1973	2	1.190	1.180	1.250	1.320	1.670
1973	3	1.150	1.190	1.280	1.800	2.290
1973	4	1.140	1.180	1.600	2.000	2.250
1974	1	*****	1.650	2.100	2.600	2.680
1974	2	1.600	1.900	2.750	2.750	2.480
1974	3	1.700	2.400	2.500	2.800	3.190
1974	4	1.500	1.650	2.700	3.600	3.350
THEIL-U						0.317

THEIL-U

1.287

1.014

0.642

0.317

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-8--FORECAST EVALUATION OF FARM PRICE OF CORN (DOL/BU.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	* - - - - R E V I S I O N R A T I O - - - *				
						R1.2	R1.3	R1.4	R2.3	R3.4
1966	1	*****	-7.56	-11.76	-7.56	*****	*****	*****	-0.56	0.36
1966	2	-4.17	-8.33	-5.00	-5.83	-1.00	-0.20	-0.40	0.40	-0.17
1966	3	-14.39	-13.64	-15.15	-7.58	0.05	-0.05	0.47	-0.11	0.50
1966	4	-19.53	-19.53	-14.06	-6.25	0.0	0.28	0.68	0.28	0.56
1967	1	-10.24	-7.09	-1.57	3.94	0.31	0.85	1.38	0.78	3.50
1967	2	-1.59	1.59	6.35	3.17	2.00	5.00	3.00	-3.00	0.50
1967	3	8.70	8.70	13.04	4.35	0.0	-0.50	0.50	-0.50	0.67
1967	4	7.84	22.55	7.84	2.94	-1.87	0.0	0.63	0.65	0.63
1968	1	*****	9.52	2.86	0.0	*****	*****	*****	0.70	1.00
1968	2	2.80	4.67	2.80	1.87	-0.67	0.0	0.33	0.40	0.33
1968	3	13.86	12.87	12.87	4.95	0.07	0.07	0.64	0.0	0.62
1968	4	7.84	7.84	0.0	-5.88	0.0	1.00	1.75	1.00	-6.00
1969	1	*****	-2.75	-6.42	-0.92	*****	*****	*****	-1.33	0.86
1969	2	-5.17	-7.76	-5.17	-4.31	-0.50	0.0	0.17	0.33	0.17
1969	3	-7.69	-4.27	-4.27	0.0	0.44	0.44	1.00	0.0	1.00
1969	4	-3.67	-3.67	0.92	0.92	0.0	1.25	1.25	1.25	0.0
1970	1	*****	0.0	0.88	0.88	*****	*****	*****	1.00	0.0
1970	2	-0.85	0.0	0.0	-2.54	1.00	1.00	-2.00	0.0	-3.00
1970	3	-9.23	-9.23	-10.77	-6.15	0.0	-0.17	0.33	-0.17	0.43
1970	4	-19.55	-19.55	-17.29	-3.76	0.0	0.12	0.81	0.12	0.78
1971	1	*****	-20.98	-9.09	-0.70	*****	*****	*****	0.57	0.92
1971	2	-16.31	-4.96	2.13	0.71	0.70	1.13	1.04	1.43	0.67
1971	3	8.20	14.75	11.48	8.20	-0.80	-0.40	0.0	0.22	0.29
1971	4	27.45	22.55	12.75	-3.92	0.18	0.54	1.14	0.43	1.31
1972	1	*****	8.26	-7.34	-2.75	*****	*****	*****	1.89	0.63
1972	2	5.26	-7.89	-5.26	-1.75	2.50	2.00	1.33	0.33	0.67
1972	3	-7.69	-5.98	-4.27	-2.56	0.22	0.44	0.67	0.29	0.40
1972	4	-11.81	-17.32	-14.96	-11.02	-0.47	-0.27	0.07	0.14	0.26
1973	1	*****	-17.52	-16.06	-2.92	*****	*****	*****	0.08	0.82
1973	2	-28.74	-29.34	-25.15	-20.96	-0.02	0.13	0.27	0.14	0.17
1973	3	-49.78	-48.03	-44.10	-21.40	0.04	0.11	0.57	0.08	0.51
1973	4	-49.33	-47.56	-28.89	-11.11	0.04	0.41	0.77	0.39	0.62
1974	1	*****	-38.43	-21.64	-2.99	*****	*****	*****	0.44	0.86
1974	2	-35.48	-23.39	10.89	10.89	0.34	1.31	1.31	1.47	0.0
1974	3	-46.71	-24.76	-21.63	-12.23	0.47	0.54	0.74	0.13	0.43
1974	4	-55.22	-50.75	-19.40	7.46	0.08	0.65	1.14	0.62	1.38

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-9--FORECAST EVALUATION OF FARM PRICE OF GRAIN SORGHUMS (DOL/CWT.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - - F O R E C A S T - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	1.750	1.700	1.830	1.770
1966	2	1.780	1.760	1.860	1.800	1.770
1966	3	1.750	1.820	1.800	1.850	1.850
1966	4	1.720	1.700	1.800	1.800	1.780
1967	1	1.780	1.850	1.880	1.920	1.900
1967	2	1.900	1.900	1.950	2.000	1.960
1967	3	1.850	1.900	2.000	1.900	1.940
1967	4	1.750	1.950	1.750	1.680	1.700
1968	1	*****	1.800	1.700	1.720	1.820
1968	2	1.850	1.750	1.750	1.840	1.820
1968	3	1.800	1.800	1.820	1.740	1.660
1968	4	1.750	1.780	1.700	1.600	1.670
1969	1	*****	1.740	1.660	1.740	1.760
1969	2	1.760	1.720	1.780	1.780	1.790
1969	3	1.740	1.760	1.740	1.800	1.900
1969	4	1.700	1.700	1.700	1.820	1.920
1970	1	*****	1.760	1.860	1.900	1.900
1970	2	1.840	1.880	1.900	1.920	1.800
1970	3	1.860	1.880	1.920	1.840	1.970
1970	4	1.800	1.850	1.800	2.060	2.030
1971	1	*****	1.860	2.120	2.180	2.140
1971	2	1.900	2.150	2.220	2.200	2.320
1971	3	2.100	2.120	2.100	2.120	2.220
1971	4	1.900	1.900	1.950	1.780	1.800
1972	1	*****	2.000	1.780	1.850	1.870
1972	2	2.050	1.850	1.870	1.880	1.880
1972	3	1.850	1.850	1.850	1.950	2.050
1972	4	1.920	1.800	1.850	2.050	2.330
1973	1	*****	1.950	2.050	2.660	2.640
1973	2	2.050	2.050	2.400	2.540	2.770
1973	3	2.000	2.150	2.250	3.200	3.660
1973	4	2.050	2.020	2.850	3.400	3.710
1974	1	*****	2.950	3.500	4.250	4.220
1974	2	2.850	3.100	4.600	4.600	3.650
1974	3	2.750	4.100	4.250	4.200	4.840
1974	4	2.600	2.900	4.100	5.800	5.650
THEIL-U		1.300	1.038	0.711	0.347	

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-10--FORECAST EVALUATION OF FARM PRICE OF GRAIN SORGHUMS (DOL/CWT.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	* - - - - R E V I S I O N - - - *				* - - - - R A T I O - - - *			
						R1.2	R1.3	R1.4	R2.3	R3.4			
1966	1	*****	-1.13	-3.95	3.39	*****	*****	*****	-2.50			1.86	
1966	2	0.56	-0.56	5.08	1.69	2.00	-8.00	-2.00	10.00			0.67	
1966	3	-5.41	-1.62	-2.70	0.0	0.70	0.50	1.00	-0.67			1.00	
1966	4	-3.37	-4.49	1.12	1.12	-0.33	1.33	1.33	1.25			0.0	
1967	1	-6.32	-2.63	-1.05	1.05	0.58	0.83	1.17	0.60			2.00	
1967	2	-3.06	-3.06	0.51	2.04	0.0	0.83	1.67	0.83			5.00	
1967	3	-4.64	-2.06	3.09	-2.06	0.56	1.67	0.56	2.50			1.67	
1967	4	2.94	14.71	2.94	-1.18	-4.00	0.0	1.40	0.80			1.40	
1968	1	*****	-1.10	-6.59	-5.49	*****	*****	*****	-5.00			0.17	
1968	2	1.65	-3.85	-3.85	1.10	3.33	3.33	0.33	0.0			1.29	
1968	3	8.43	8.43	9.64	4.82	0.0	-0.14	0.43	-0.14			0.50	
1968	4	4.79	6.59	1.80	-4.19	-0.37	0.63	1.87	0.73			3.33	
1969	1	*****	-1.14	-5.68	-1.14	*****	*****	*****	-4.00			0.80	
1969	2	-1.68	-3.91	-0.56	-0.56	-1.33	0.67	0.67	0.86			0.0	
1969	3	-8.42	-7.37	-8.42	-5.26	0.13	0.0	0.38	-0.14			0.38	
1969	4	-11.46	-11.46	-11.46	-5.21	0.0	0.0	0.55	0.0			0.55	
1970	1	*****	-7.37	-2.11	0.0	*****	*****	*****	0.71			1.00	
1970	2	2.22	4.44	5.56	6.67	-1.00	-1.50	-2.00	-0.25			-0.20	
1970	3	-5.58	-4.57	-2.54	-6.60	0.18	0.55	-0.18	0.44			-1.60	
1970	4	-11.33	-8.87	-11.33	1.48	0.22	0.0	1.13	-0.28			1.13	
1971	1	*****	-13.08	-0.93	1.87	*****	*****	*****	0.93			3.00	
1971	2	-18.10	-7.33	-4.31	-5.17	0.60	0.76	0.71	0.41			-0.20	
1971	3	-5.41	-4.50	-5.41	-4.50	0.17	0.0	0.17	-0.20			0.17	
1971	4	5.56	5.56	8.33	-1.11	0.0	-0.50	1.20	-0.50			1.13	
1972	1	*****	6.95	-4.81	-1.07	*****	*****	*****	1.69			0.78	
1972	2	9.04	-1.60	-0.53	0.0	1.18	1.06	1.00	0.67			1.00	
1972	3	-9.76	-9.76	-9.76	-4.88	0.0	0.0	0.50	0.0			0.50	
1972	4	-17.60	-22.75	-20.60	-12.02	-0.29	-0.17	0.32	0.09			0.42	
1973	1	*****	-26.14	-22.35	0.76	*****	*****	*****	0.14			1.03	
1973	2	-25.99	-25.99	-13.36	-8.30	0.0	0.49	0.68	0.49			0.38	
1973	3	-45.36	-41.26	-38.52	-12.57	0.09	0.15	0.72	0.07			0.67	
1973	4	-44.74	-45.55	-23.18	-8.36	-0.02	0.48	0.81	0.49			0.64	
1974	1	*****	-30.09	-17.06	0.71	*****	*****	*****	0.43			1.04	
1974	2	-21.92	-15.07	26.03	26.03	0.31	2.19	2.19	2.73			0.0	
1974	3	-43.18	-15.29	-12.19	-13.22	0.65	0.72	0.69	0.20			-0.08	
1974	4	-53.98	-48.67	-27.43	2.65	0.10	0.49	1.05	0.44			1.10	

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-11--FORECAST EVALUATION OF FARM PRICE OF OATS (DOL./BU.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - - F O R E C A S T - - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	0.640	0.630	0.660	0.646
1966	2	0.640	0.640	0.650	0.650	0.657
1966	3	0.590	0.600	0.600	0.650	0.649
1966	4	0.620	0.610	0.660	0.660	0.666
1967	1	0.640	0.670	0.680	0.680	0.679
1967	2	0.700	0.660	0.680	0.670	0.697
1967	3	0.650	0.650	0.660	0.660	0.643
1967	4	0.660	0.680	0.660	0.650	0.653
1968	1	*****	0.670	0.670	0.670	0.680
1968	2	0.680	0.680	0.680	0.680	0.693
1968	3	0.650	0.650	0.650	0.620	0.567
1968	4	0.660	0.660	0.630	0.570	0.597
1969	1	*****	0.650	0.600	0.620	0.630
1969	2	0.650	0.620	0.630	0.620	0.621
1969	3	0.580	0.600	0.580	0.580	0.551
1969	4	0.630	0.600	0.610	0.570	0.576
1970	1	*****	0.630	0.600	0.610	0.586
1970	2	0.630	0.620	0.630	0.590	0.601
1970	3	0.550	0.560	0.540	0.550	0.586
1970	4	0.570	0.560	0.580	0.620	0.632
1971	1	*****	0.600	0.640	0.670	0.667
1971	2	0.600	0.650	0.680	0.650	0.667
1971	3	0.600	0.620	0.600	0.580	0.585
1971	4	0.640	0.620	0.600	0.560	0.599
1972	1	*****	0.620	0.580	0.620	0.637
1972	2	0.630	0.600	0.600	0.600	0.646
1972	3	0.580	0.580	0.580	0.600	0.641
1972	4	0.600	0.600	0.620	0.670	0.726
1973	1	*****	0.630	0.680	0.750	0.786
1973	2	0.650	0.680	0.640	0.670	0.825
1973	3	0.620	0.590	0.610	0.850	1.020
1973	4	0.610	0.640	0.870	1.000	1.160
1974	1	*****	0.890	1.050	1.400	1.390
1974	2	0.870	0.950	1.490	1.400	1.270
1974	3	0.800	1.300	1.250	1.450	1.500
1974	4	0.820	0.850	1.400	1.700	1.690
THEIL-U		1.319	1.043	0.653	0.277	

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-12--FORECAST EVALUATION OF FARM PRICE OF OATS (DOL./BU.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	PERCENT ERROR				REVISION RATIO				
		1ST	2ND	3RD	4TH	R1.2	R1.3	R1.4	R2.3	R3.4
1966	1	*****	-0.93	-2.48	2.17	*****	*****	*****	-1.67	1.87
1966	2	-2.59	-2.59	-1.07	-1.07	0.0	0.59	0.59	0.59	0.0
1966	3	-9.09	-7.55	-7.55	0.15	0.17	0.17	1.02	0.0	1.02
1966	4	-6.91	-8.41	-0.90	-0.90	-0.22	0.87	0.87	0.89	0.0
1967	1	-5.74	-1.33	0.15	0.15	0.77	1.03	1.03	1.11	0.0
1967	2	0.43	-5.31	-2.44	-3.87	13.33	6.67	10.00	0.54	-0.59
1967	3	1.09	1.09	2.64	2.64	0.0	-1.43	-1.43	-1.43	0.0
1967	4	1.07	4.13	1.07	-0.46	-2.86	0.0	1.43	0.74	1.43
1968	1	*****	-1.47	-1.47	-1.47	*****	*****	*****	0.0	0.0
1968	2	-1.88	-1.88	-1.88	-1.88	0.0	0.0	0.0	0.0	0.0
1968	3	14.64	14.64	14.64	9.35	0.0	0.0	0.36	0.0	0.36
1968	4	10.55	10.55	5.53	-4.52	0.0	0.48	1.43	0.48	1.82
1969	1	*****	3.17	-4.76	-1.59	*****	*****	*****	2.50	0.67
1969	2	4.67	-0.16	1.45	-0.16	1.03	0.69	1.03	10.00	1.11
1969	3	5.26	8.89	5.26	5.26	-0.69	0.0	0.0	0.41	0.0
1969	4	9.38	4.17	5.90	-1.04	0.56	0.37	1.11	-0.42	1.18
1970	1	*****	7.51	2.39	4.10	*****	*****	*****	0.68	-0.71
1970	2	4.83	3.16	4.83	-1.83	0.34	0.0	1.38	-0.53	1.38
1970	3	-6.14	-4.44	-7.85	-6.14	0.28	-0.28	0.0	-0.77	0.22
1970	4	-9.81	-11.39	-8.23	-1.90	-0.16	0.16	0.81	0.28	0.77
1971	1	*****	-10.04	-4.05	0.45	*****	*****	*****	0.60	1.11
1971	2	-10.04	-2.55	1.95	-2.55	0.75	1.19	0.75	1.76	2.31
1971	3	2.56	5.98	2.56	-0.85	-1.33	0.0	1.33	0.57	1.33
1971	4	6.84	3.51	0.17	-6.51	0.49	0.98	1.95	0.95	40.00
1972	1	*****	-2.67	-8.95	-2.67	*****	*****	*****	-2.35	0.70
1972	2	-2.48	-7.12	-7.12	-7.12	-1.87	-1.87	-1.87	0.0	0.0
1972	3	-9.52	-9.52	-9.52	-6.40	0.0	0.0	0.33	0.0	0.33
1972	4	-17.36	-17.36	-14.60	-7.71	0.0	0.16	0.56	0.16	0.47
1973	1	*****	-19.85	-13.49	-4.58	*****	*****	*****	0.32	0.66
1973	2	-21.21	-17.58	-22.42	-18.79	0.17	-0.06	0.11	-0.28	0.16
1973	3	-39.22	-42.16	-40.20	-16.67	-0.07	-0.02	0.57	0.05	0.59
1973	4	-47.41	-44.83	-25.00	-13.79	0.05	0.47	0.71	0.44	0.45
1974	1	*****	-35.97	-24.46	0.72	*****	*****	*****	0.32	1.03
1974	2	-31.50	-25.20	17.32	10.24	0.20	1.55	1.32	1.69	0.41
1974	3	-46.67	-13.33	-16.67	-3.33	0.71	0.64	0.93	-0.25	0.80
1974	4	-51.48	-49.70	-17.16	0.59	0.03	0.67	1.01	0.65	1.03

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-13--FORECAST EVALUATION OF FARM PRICE OF BARLEY (DOL./BU.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - F O R E C A S T - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	1.000	1.020	1.030	1.050
1966	2	1.030	1.020	1.020	1.040	1.060
1966	3	0.970	0.980	0.980	1.030	1.060
1966	4	1.000	1.000	1.050	1.080	1.060
1967	1	1.030	1.060	1.120	1.080	1.040
1967	2	1.070	1.100	1.070	1.030	1.040
1967	3	1.050	1.050	1.060	1.020	1.020
1967	4	1.060	1.090	1.020	1.000	0.986
1968	1	*****	1.040	1.020	0.980	0.987
1968	2	1.050	1.040	1.000	0.960	0.977
1968	3	1.040	0.970	0.940	0.920	0.874
1968	4	0.980	0.970	0.940	0.900	0.935
1969	1	*****	0.960	0.920	0.920	0.914
1969	2	0.960	0.940	0.940	0.920	0.979
1969	3	0.880	0.900	0.870	0.900	0.878
1969	4	0.950	0.900	0.940	0.900	0.896
1970	1	*****	0.980	0.920	0.900	0.862
1970	2	1.000	0.920	0.900	0.850	0.890
1970	3	0.880	0.860	0.830	0.840	0.886
1970	4	0.880	0.850	0.860	0.930	0.973
1971	1	*****	0.880	0.960	1.020	1.020
1971	2	0.880	1.000	1.040	1.000	1.100
1971	3	0.900	0.960	0.920	0.900	0.952
1971	4	0.980	0.950	0.920	0.900	1.010
1972	1	*****	0.950	0.920	1.000	1.010
1972	2	0.980	0.920	0.960	0.960	1.040
1972	3	0.850	0.900	0.900	1.000	1.020
1972	4	0.940	0.940	1.030	1.100	1.230
1973	1	*****	1.060	1.120	1.300	1.360
1973	2	1.080	1.080	1.150	1.200	1.420
1973	3	1.000	1.050	1.080	1.580	1.950
1973	4	1.070	1.100	1.600	2.150	2.170
1974	1	*****	1.630	2.250	2.450	2.480
1974	2	1.550	2.000	2.600	2.500	2.200
1974	3	1.560	2.250	2.250	2.350	2.660
1974	4	1.450	1.500	2.250	3.100	3.270
THEIL-U						
			1.302	1.055	0.690	0.285

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-14--FORECAST EVALUATION OF FARM PRICE OF BARLEY (DOL./BU.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	* - - - - - P E R C E N T E R R O R - - - *	* - - - - R E V I S I O N R A T I O - - - *	R1.2	R1.3	R1.4	R2.3	R3.4
1966	1	*****	-4.76	-2.86	-1.90			*****	*****	*****	0.40	0.33
1966	2	-2.83	-3.77	-3.77	-1.89			-0.33	-0.33	0.33	0.0	0.50
1966	3	-8.49	-7.55	-7.55	-2.83			0.11	0.11	0.67	0.0	0.62
1966	4	-5.66	-5.66	-0.94	1.89			0.0	0.83	1.33	0.83	3.00
1967	1	-0.96	1.92	7.69	3.85			3.00	9.00	5.00	-3.00	0.50
1967	2	2.88	5.77	2.88	-0.96			-1.00	0.0	1.33	0.50	1.33
1967	3	2.94	2.94	3.92	0.0			0.0	-0.33	1.00	-0.33	1.00
1967	4	7.51	10.55	3.45	1.42			-0.41	0.54	0.81	0.67	0.59
1968	1	*****	5.37	3.34	-0.71			*****	*****	*****	0.38	1.21
1968	2	7.47	6.45	2.35	-1.74			0.14	0.68	1.23	0.63	1.74
1968	3	18.99	10.98	7.55	5.26			0.42	0.60	0.72	0.31	0.30
1968	4	4.81	3.74	0.53	-3.74			0.22	0.89	1.78	0.86	8.00
1969	1	*****	5.03	0.66	0.66			*****	*****	*****	0.87	0.0
1969	2	-1.94	-3.98	-3.98	-6.03			-1.05	-1.05	-2.11	0.0	-0.51
1969	3	0.23	2.51	-0.91	2.51			-10.00	5.00	-10.00	1.36	3.75
1969	4	6.03	0.45	4.91	0.45			0.93	0.19	0.93	-10.00	0.91
1970	1	*****	13.69	6.73	4.41			*****	*****	*****	0.51	0.34
1970	2	12.36	3.37	1.12	-4.49			0.73	0.91	1.36	0.67	5.00
1970	3	-0.68	-2.93	-6.32	-5.19			-3.33	-8.33	-6.67	-1.15	0.18
1970	4	-9.56	-12.64	-11.61	-4.42			-0.32	-0.22	0.54	0.08	0.62
1971	1	*****	-13.73	-5.88	0.0			*****	*****	*****	0.57	1.00
1971	2	-20.00	-9.09	-5.45	-9.09			0.55	0.73	0.55	0.40	-0.67
1971	3	-5.46	0.84	-3.36	-5.46			1.15	0.38	0.0	5.00	-0.63
1971	4	-2.97	-5.94	-8.91	-10.89			-1.00	-2.00	-2.67	-0.50	-0.22
1972	1	*****	-5.94	-8.91	-0.99			*****	*****	*****	-0.50	0.89
1972	2	-5.77	-11.54	-7.69	-7.69			-1.00	-0.33	-0.33	0.33	0.0
1972	3	-16.67	-11.76	-11.76	-1.96			0.29	0.29	0.88	0.0	0.83
1972	4	-23.58	-23.58	-16.26	-10.57			0.0	0.31	0.55	0.31	0.35
1973	1	*****	-22.06	-17.65	-4.41			*****	*****	*****	0.20	0.75
1973	2	-23.94	-23.94	-19.01	-15.49			0.0	0.21	0.35	0.21	0.19
1973	3	-48.72	-46.15	-44.62	-18.97			0.05	0.08	0.61	0.03	0.57
1973	4	-50.69	-49.31	-26.27	-0.92			0.03	0.48	0.98	0.47	0.96
1974	1	*****	-34.27	-9.27	-1.21			*****	*****	*****	0.73	0.87
1974	2	-29.55	-9.09	18.18	13.64			0.69	1.62	1.46	3.00	0.25
1974	3	-41.35	-15.41	-15.41	-11.65			0.63	0.63	0.72	0.0	0.24
1974	4	-55.66	-54.13	-31.19	-5.20			0.03	0.44	0.91	0.42	0.83

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-15--FORECAST EVALUATION OF FARM PRICE OF TOBACCO (DOL./LB.)
FORECASTS. REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - - F O R E C A S T - - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	0.588	0.610	0.629	0.625
1966	2	0.589	0.613	0.628	0.629	0.629
1966	3	0.612	0.630	0.630	0.629	0.641
1966	4	0.632	0.631	0.623	0.657	0.644
1967	1	0.629	0.627	0.660	0.645	0.643
1967	2	0.625	0.658	0.642	0.641	0.643
1967	3	0.652	0.650	0.650	0.642	0.635
1967	4	0.653	0.653	0.639	0.635	0.631
1968	1	*****	0.641	0.636	0.643	0.644
1968	2	0.642	0.638	0.644	0.645	0.647
1968	3	0.648	0.661	0.655	0.659	0.658
1968	4	0.653	0.648	0.662	0.656	0.660
1969	1	*****	0.657	0.657	0.669	0.669
1969	2	0.656	0.656	0.670	0.671	0.673
1969	3	0.676	0.691	0.680	0.676	0.695
1969	4	0.683	0.685	0.683	0.683	0.696
1970	1	*****	0.675	0.684	0.693	0.692
1970	2	0.674	0.685	0.694	0.671	0.694
1970	3	0.699	0.700	0.680	0.697	0.699
1970	4	0.707	0.685	0.705	0.709	0.692
1971	1	*****	0.707	0.710	0.702	0.705
1971	2	0.708	0.711	0.703	0.705	0.706
1971	3	0.722	0.719	0.721	0.722	0.719
1971	4	0.727	0.730	0.735	0.732	0.751
1972	1	*****	0.735	0.750	0.762	0.767
1972	2	0.735	0.750	0.763	0.764	0.766
1972	3	0.751	0.767	0.769	0.767	0.809
1972	4	0.767	0.767	0.776	0.814	0.809
1973	1	*****	0.776	0.815	0.813	0.813
1973	2	0.776	0.815	0.814	0.809	0.813
1973	3	0.817	0.799	0.795	0.814	0.821
1973	4	0.812	0.807	0.835	0.832	0.850
1974	1	*****	0.834	0.855	0.870	0.877
1974	2	0.835	0.855	0.870	0.879	0.880
1974	3	0.855	0.890	0.890	0.900	0.962
1974	4	0.895	0.900	0.920	1.050	1.049
THEIL-U						0.276
						0.629
						0.522

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-16--FORECAST EVALUATION OF FARM PRICE OF TOBACCO (DOL./LB.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	* - - P E R C E N T E R R O R - - *				* - - - - R E V I S I O N R A T I O - - *				
		1ST	2ND	3RD	4TH	R1.2	R1.3	R1.4	R2.3	R3.4
1966	1	*****	-5.92	-2.40	0.64	*****	*****	*****	0.59	1.27
1966	2	-6.36	-2.54	-0.16	0.0	0.60	0.98	1.00	0.94	1.00
1966	3	-4.52	-1.72	-1.72	-1.87	0.62	0.62	0.59	0.0	-0.09
1966	4	-1.86	-2.02	-3.26	2.02	-0.08	-0.75	2.08	-0.62	1.62
1967	1	-2.18	-2.49	2.64	0.31	-0.14	2.21	1.14	2.06	0.88
1967	2	-2.80	2.33	-0.16	-0.31	1.83	0.94	0.89	1.07	-1.00
1967	3	2.68	2.36	2.36	1.10	0.12	0.12	0.59	0.0	0.53
1967	4	3.49	3.49	1.27	0.63	0.0	0.64	0.82	0.64	0.50
1968	1	*****	-0.47	-1.24	-0.16	*****	*****	*****	-1.67	0.88
1968	2	-0.77	-1.39	-0.46	-0.31	-0.80	0.40	0.60	0.67	0.33
1968	3	-1.52	0.46	-0.46	0.15	1.30	0.70	1.10	2.00	1.33
1968	4	-1.06	-1.82	0.30	-0.61	-0.71	1.29	0.43	1.17	3.00
1969	1	*****	-1.79	-1.79	0.0	*****	*****	*****	0.0	1.00
1969	2	-2.53	-2.53	-0.45	-0.30	0.0	0.82	0.88	0.82	0.33
1969	3	-2.73	-0.58	-2.16	-2.73	0.79	0.21	0.0	-2.75	-0.27
1969	4	-1.87	-1.58	-1.87	-1.87	0.15	0.0	0.0	-0.18	0.0
1970	1	*****	-2.46	-1.16	0.14	*****	*****	*****	0.53	1.13
1970	2	-2.88	-1.30	0.0	-3.31	0.55	1.00	-0.15	1.00	-2.30
1970	3	0.0	0.14	-2.72	-0.29	0.10	-1.90	-0.20	20.00	0.89
1970	4	2.17	-1.01	1.88	2.46	1.47	0.13	-0.13	2.86	-0.31
1971	1	*****	0.28	0.71	-0.43	*****	*****	*****	-1.50	1.60
1971	2	0.28	0.71	-0.42	-0.14	-1.50	2.50	1.50	1.60	0.67
1971	3	0.42	0.0	0.28	0.42	1.00	0.33	0.0	0.20	-0.50
1971	4	-3.20	-2.80	-2.13	-2.53	0.13	0.33	0.21	0.24	-0.19
1972	1	*****	-4.17	-2.22	-0.65	*****	*****	*****	0.47	0.71
1972	2	-4.05	-2.09	-0.39	-0.26	0.48	0.90	0.94	0.81	0.33
1972	3	-7.17	-5.19	-4.94	-5.19	0.28	0.31	0.28	0.05	-0.05
1972	4	-5.19	-5.19	-4.08	0.62	0.0	0.21	1.12	0.21	1.15
1973	1	*****	-4.55	0.25	0.0	*****	*****	*****	1.05	1.00
1973	2	-4.55	0.25	0.12	-0.49	1.05	1.03	0.89	0.50	5.00
1973	3	-0.49	-2.68	-3.17	-0.85	-4.50	-5.50	-0.75	-0.18	0.73
1973	4	-4.47	-5.06	-1.76	-2.12	-0.13	0.61	0.53	0.65	-0.20
1974	1	*****	-4.90	-2.51	-0.80	*****	*****	*****	0.49	0.68
1974	2	-5.11	-2.84	-1.14	-0.11	0.44	0.78	0.98	0.60	0.90
1974	3	-11.12	-7.48	-7.48	-6.44	0.33	0.33	0.42	0.0	0.14
1974	4	-14.68	-14.20	-12.30	0.10	0.03	0.16	1.01	0.13	1.01

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-17--FORECAST EVALUATION OF FARM PRICE OF PEANUTS (DOL./LB.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - - F O R E C A S T - - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	0.116	0.115	0.115	0.117
1966	2	0.115	0.113	0.113	0.115	0.114
1966	3	0.110	0.110	0.115	0.115	0.113
1966	4	0.110	0.115	0.116	0.115	0.113
1967	1	0.115	0.116	0.120	0.115	0.115
1967	2	0.116	0.115	0.113	0.113	0.112
1967	3	0.115	0.113	0.113	0.113	0.114
1967	4	0.112	0.113	0.113	0.114	0.113
1968	1	*****	0.115	0.115	0.115	0.114
1968	2	0.113	0.113	0.113	0.113	0.114
1968	3	0.113	0.113	0.113	0.113	0.116
1968	4	0.114	0.114	0.113	0.120	0.120
1969	1	*****	0.115	0.120	0.120	0.118
1969	2	0.114	0.125	0.125	0.120	0.118
1969	3	0.120	0.120	0.123	0.120	0.120
1969	4	0.120	0.125	0.122	0.122	0.125
1970	1	*****	0.120	0.123	0.122	0.121
1970	2	0.120	0.124	0.124	0.122	0.121
1970	3	0.124	0.124	0.124	0.124	0.124
1970	4	0.125	0.128	0.128	0.128	0.125
1971	1	*****	0.128	0.128	0.129	0.123
1971	2	0.128	0.128	0.132	0.125	0.120
1971	3	0.129	0.135	0.128	0.125	0.128
1971	4	0.135	0.132	0.127	0.134	0.138
1972	1	*****	0.130	0.134	0.137	0.139
1972	2	0.132	0.135	0.136	0.138	0.139
1972	3	0.137	0.137	0.140	0.140	0.139
1972	4	0.139	0.141	0.144	0.143	0.143
1973	1	*****	0.145	0.143	0.143	0.152
1973	2	0.147	0.143	0.143	0.152	0.152
1973	3	0.145	0.145	0.150	0.158	0.154
1973	4	0.150	0.155	0.160	0.164	0.163
1974	1	*****	0.162	0.164	0.164	0.166
1974	2	0.162	0.164	0.165	0.165	0.166
1974	3	0.166	0.170	0.180	0.185	0.174
1974	4	0.175	0.183	0.185	0.182	0.178
THEIL-U						
		0.500	0.491	0.502	0.347	

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table R-18--FORECAST EVALUATION OF FARM PRICE OF PEANUTS (DOL./LB.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	* - - - - R E V I S I O N				* - - - - R A T I O - - - *			
						R1.2	R1.3	R1.4		R2.3		R3.4	
1966	1	*****	-0.85	-1.71	-1.71	*****	*****	*****	*****	-1.00		0.0	
1966	2	0.88	-0.88	-0.88	0.88	2.00	2.00	0.0	0.0	0.0		2.00	
1966	3	-2.65	-2.65	1.77	1.77	0.0	1.67	1.67	1.67	1.67		0.0	
1966	4	-2.65	1.77	2.65	1.77	1.67	2.00	1.67	1.67	-0.50		0.33	
1967	1	0.0	0.87	4.35	0.0	0.10	0.50	0.0	0.0	-4.00		1.00	
1967	2	3.57	2.68	0.89	0.89	0.25	0.75	0.75	0.75	0.67		0.0	
1967	3	0.88	-0.88	-0.88	-0.88	2.00	2.00	2.00	2.00	0.0		0.0	
1967	4	-0.88	0.0	0.0	0.88	1.00	1.00	2.00	2.00	0.0		0.10	
1968	1	*****	0.88	0.88	0.88	*****	*****	*****	*****	0.0		0.0	
1968	2	-0.88	-0.88	-0.88	-0.88	0.0	0.0	0.0	0.0	0.0		0.0	
1968	3	-2.59	-2.59	-2.59	-2.59	0.0	0.0	0.0	0.0	0.0		0.0	
1968	4	-5.00	-5.00	-5.83	0.0	0.0	-0.17	1.00	1.00	-0.17		1.00	
1969	1	*****	-2.54	1.69	1.69	*****	*****	*****	*****	1.67		0.0	
1969	2	-3.39	5.93	5.93	1.69	2.75	2.75	1.50	1.50	0.0		0.71	
1969	3	0.0	0.0	2.50	0.0	0.0	0.30	0.0	0.0	0.30		1.00	
1969	4	-4.00	0.0	-2.40	-2.40	1.00	0.40	0.40	0.40	-0.30		0.0	
1970	1	*****	-0.83	1.65	0.83	*****	*****	*****	*****	3.00		0.50	
1970	2	-0.83	2.48	2.48	0.83	4.00	4.00	2.00	2.00	0.0		0.67	
1970	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
1970	4	0.0	2.40	2.40	2.40	0.30	0.30	0.30	0.30	0.0		0.0	
1971	1	*****	4.07	4.07	4.88	*****	*****	*****	*****	0.0		-0.20	
1971	2	6.67	6.67	10.00	4.17	0.0	-0.50	0.38	0.38	-0.50		0.58	
1971	3	0.78	5.47	0.0	-2.34	-6.00	1.00	4.00	4.00	1.00		-0.30	
1971	4	-2.17	-4.35	-7.97	-2.90	-1.00	-2.67	-0.33	-0.33	-0.83		0.64	
1972	1	*****	-6.47	-3.60	-1.44	*****	*****	*****	*****	0.44		0.60	
1972	2	-5.04	-2.88	-2.16	-0.72	0.43	0.57	0.86	0.86	0.25		0.67	
1972	3	-1.44	-1.44	0.72	0.72	0.0	1.50	1.50	1.50	1.50		0.0	
1972	4	-2.80	-1.40	0.70	0.0	0.50	1.25	1.00	1.00	1.50		1.00	
1973	1	*****	-4.61	-5.92	-5.92	*****	*****	*****	*****	-0.29		0.0	
1973	2	-3.29	-5.92	-5.92	0.0	-0.80	-0.80	1.00	1.00	0.0		1.00	
1973	3	-5.84	-5.84	-2.60	2.60	0.0	0.56	1.44	1.44	0.56		2.00	
1973	4	-7.98	-4.91	-1.84	0.61	0.38	0.77	1.08	1.08	0.63		1.33	
1974	1	*****	-2.41	-1.20	-1.20	*****	*****	*****	*****	0.50		0.0	
1974	2	-2.41	-1.20	-0.60	-0.60	0.50	0.75	0.75	0.75	0.50		0.0	
1974	3	-4.60	-2.30	3.45	6.32	0.50	1.75	2.37	2.37	2.50		-0.83	
1974	4	-1.69	2.81	3.93	2.25	2.67	3.33	2.33	2.33	-0.40		0.43	

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-19--FORECAST EVALUATION OF FARM PRICE OF SOYBEANS (DOL./BU.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - - F O R E C A S T - - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	2.350	2.350	2.400	2.720
1966	2	2.400	2.400	2.450	2.750	2.910
1966	3	2.350	2.500	2.650	2.900	3.280
1966	4	2.350	2.550	2.800	2.700	2.800
1967	1	2.800	2.900	2.850	2.750	2.740
1967	2	2.950	2.750	2.700	2.700	2.700
1967	3	2.650	2.600	2.650	2.600	2.580
1967	4	2.600	2.600	2.500	2.470	2.450
1968	1	*****	2.600	2.510	2.500	2.560
1968	2	2.550	2.570	2.570	2.550	2.560
1968	3	2.550	2.550	2.550	2.500	2.480
1968	4	2.500	2.450	2.400	2.350	2.380
1969	1	*****	2.580	2.400	2.480	2.470
1969	2	2.550	2.450	2.450	2.550	2.530
1969	3	2.500	2.500	2.500	2.450	2.440
1969	4	2.400	2.200	2.100	2.150	2.280
1970	1	*****	2.150	2.250	2.350	2.390
1970	2	2.200	2.300	2.400	2.500	2.530
1970	3	2.200	2.350	2.500	2.550	2.680
1970	4	2.250	2.300	2.350	2.750	2.800
1971	1	*****	2.450	2.800	2.850	2.900
1971	2	2.500	2.850	2.950	2.800	2.880
1971	3	2.750	2.850	2.900	2.880	3.070
1971	4	2.500	2.750	3.200	3.100	2.910
1972	1	*****	3.100	3.200	3.000	3.040
1972	2	3.250	3.300	3.150	3.300	3.350
1972	3	3.200	3.100	3.250	3.250	3.320
1972	4	3.000	3.000	2.850	3.050	3.490
1973	1	*****	3.000	3.150	4.250	5.210
1973	2	3.150	3.250	3.750	5.750	8.140
1973	3	3.150	3.500	5.000	6.500	7.160
1973	4	2.850	3.250	5.000	5.250	5.470
1974	1	*****	5.500	5.350	5.750	5.970
1974	2	5.500	5.000	5.780	5.250	5.160
1974	3	4.500	5.500	5.000	7.000	6.990
1974	4	5.000	5.000	8.000	8.250	7.550
THEIL-U						0.358
						0.741
						0.958

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-20--FORECAST EVALUATION OF FARM PRICE OF SOYBEANS (DOL./BU.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

* - - - P E R C E N T E R R O R - - - *						* - - - R E V I S I O N R A T I O - - - *				
YEAR	QUARTER	1ST	2ND	3RD	4TH	R1.2	R1.3	R1.4	R2.3	R3.4
1966	1	*****	-13.60	-13.60	-11.76	*****	*****	*****	0.0	0.14
1966	2	-17.53	-17.53	-15.81	-5.50	0.0	0.10	0.69	0.10	0.65
1966	3	-28.35	-23.78	-19.21	-11.59	0.16	0.32	0.59	0.19	0.40
1966	4	-16.07	-8.93	0.0	-3.57	0.44	1.00	0.78	1.00	-10.00
1967	1	2.19	5.84	4.01	0.36	-1.67	-0.83	0.83	0.31	0.91
1967	2	9.26	1.85	0.0	0.0	0.80	1.00	1.00	1.00	0.0
1967	3	2.71	0.78	2.71	0.78	0.71	0.0	0.71	-2.50	0.71
1967	4	6.12	6.12	2.04	0.82	0.0	0.67	0.87	0.67	0.60
1968	1	*****	1.56	-1.95	-2.34	*****	*****	*****	2.25	-0.20
1968	2	-0.39	0.39	0.39	-0.39	2.00	2.00	0.0	0.0	2.00
1968	3	2.82	2.82	2.82	0.81	0.0	0.0	0.71	0.0	0.71
1968	4	5.04	2.94	0.84	-1.26	0.42	0.83	1.25	0.71	2.50
1969	1	*****	4.45	-2.83	0.40	*****	*****	*****	1.64	1.14
1969	2	0.79	-3.16	0.79	0.79	5.00	0.0	0.0	1.25	0.0
1969	3	2.46	2.46	2.46	0.41	0.0	0.0	0.83	0.0	0.83
1969	4	5.26	-3.51	-7.89	-5.70	1.67	2.50	2.08	-1.25	0.28
1970	1	*****	-10.04	-5.86	-1.67	*****	*****	*****	0.42	0.71
1970	2	-13.04	-9.09	-5.14	-1.19	0.30	0.61	0.91	0.43	0.77
1970	3	-17.91	-12.31	-6.72	-4.85	0.31	0.62	0.73	0.45	0.28
1970	4	-19.64	-17.86	-16.07	-1.79	0.09	0.18	0.91	0.10	0.89
1971	1	*****	-15.52	-3.45	-1.72	*****	*****	*****	0.78	0.50
1971	2	-13.19	-1.04	2.43	-2.78	0.92	1.18	0.79	3.33	2.14
1971	3	-10.42	-7.17	-5.54	-6.19	0.31	0.47	0.41	0.23	-0.12
1971	4	-14.09	-5.50	9.97	6.53	0.61	1.71	1.46	2.81	0.34
1972	1	*****	1.97	5.26	-1.32	*****	*****	*****	-1.67	1.25
1972	2	-2.99	-1.49	-5.97	-1.49	0.50	-1.00	0.50	-3.00	0.75
1972	3	-3.61	-6.63	-2.11	-2.11	-0.83	0.42	0.42	0.68	0.0
1972	4	-14.04	-14.04	-18.34	-12.61	0.0	-0.31	0.10	-0.31	0.31
1973	1	*****	-42.42	-39.54	-18.43	*****	*****	*****	0.07	0.53
1973	2	-61.30	-60.07	-53.93	-29.36	0.02	0.12	0.52	0.10	0.46
1973	3	-56.01	-51.12	-30.17	-9.22	0.09	0.46	0.84	0.41	0.69
1973	4	-47.90	-40.59	-8.59	-4.02	0.15	0.82	0.92	0.79	0.53
1974	1	*****	-7.87	-10.39	-3.69	*****	*****	*****	-0.32	0.65
1974	2	6.59	-3.10	12.02	1.74	1.47	-0.82	0.74	4.88	0.85
1974	3	-35.62	-21.32	-28.47	0.14	0.40	0.20	1.00	-0.34	1.01
1974	4	-33.77	-33.77	5.96	9.27	0.0	1.18	1.27	1.18	-0.56

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-21--FORECAST EVALUATION OF FARM PRICE OF POTATOES (DOL./CWT.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - - F O R E C A S T - - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	1.750	1.700	1.600	2.200
1966	2	2.250	1.600	1.600	2.150	2.350
1966	3	1.700	1.700	1.700	1.700	2.030
1966	4	1.700	1.700	1.700	1.900	2.030
1967	1	2.500	1.750	2.000	2.400	2.190
1967	2	2.000	2.400	2.750	2.100	1.920
1967	3	2.000	2.000	2.000	2.000	2.270
1967	4	1.750	1.750	2.000	1.900	1.700
1968	1	*****	2.000	2.000	1.750	1.570
1968	2	1.900	2.100	2.250	2.800	2.410
1968	3	2.100	2.100	2.250	2.250	2.220
1968	4	1.900	2.200	2.000	2.050	1.930
1969	1	*****	2.050	2.100	2.200	2.300
1969	2	2.350	2.350	2.150	2.450	2.560
1969	3	2.250	2.250	2.250	2.250	2.260
1969	4	2.050	2.050	2.050	1.850	1.880
1970	1	*****	2.150	2.000	2.350	2.400
1970	2	2.450	2.300	3.000	2.950	2.820
1970	3	2.500	2.400	2.550	2.500	2.700
1970	4	2.100	2.000	1.900	2.200	1.950
1971	1	*****	2.200	2.450	2.150	1.990
1971	2	2.700	3.030	2.400	2.400	2.250
1971	3	2.570	2.550	2.400	2.350	2.120
1971	4	2.050	2.100	2.100	2.020	1.780
1972	1	*****	2.500	2.300	2.150	1.830
1972	2	3.000	2.650	2.550	2.500	2.050
1972	3	2.450	2.450	2.500	3.250	3.020
1972	4	2.100	1.950	2.350	2.250	2.370
1973	1	*****	2.500	2.500	2.900	3.410
1973	2	2.750	2.900	3.500	3.900	4.930
1973	3	2.600	3.150	3.200	6.750	5.770
1973	4	2.000	2.100	4.000	3.970	3.270
1974	1	*****	4.400	4.550	4.580	6.060
1974	2	4.750	5.350	5.450	7.980	7.530
1974	3	5.080	4.750	6.790	4.900	4.980
1974	4	3.120	4.500	3.620	2.830	3.750
THEIL-U						0.433

THEIL-U 0.999 0.814 0.774

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-22-- FORECAST EVALUATION OF FARM PRICE OF POTATOES (DOL./CWT.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	R1.2	R1.3	R1.4	R2.3	R3.4
1966	1	*****	-20.45	-22.73	-27.27	*****	*****	*****	-0.11	-0.20
1966	2	-4.26	-31.91	-31.91	-8.51	-6.50	-6.50	-1.00	0.0	0.73
1966	3	-16.26	-16.26	-16.26	-16.26	0.0	0.0	0.0	0.0	0.0
1966	4	-16.26	-16.26	-16.26	-6.40	0.0	0.0	0.61	0.0	0.61
1967	1	14.16	-20.09	-8.68	9.59	2.42	1.61	0.32	0.57	2.11
1967	2	4.17	25.00	43.23	9.38	-5.00	-9.38	-1.25	-0.73	0.78
1967	3	-11.89	-11.89	-11.89	-11.89	0.0	0.0	0.0	0.0	0.0
1967	4	2.94	2.94	17.65	11.76	0.0	-5.00	-3.00	-5.00	0.33
1968	1	*****	27.39	27.39	11.46	*****	*****	*****	0.0	0.58
1968	2	-21.16	-12.86	-6.64	16.18	0.39	0.69	1.76	0.48	3.44
1968	3	-5.41	-5.41	1.35	1.35	0.0	1.25	1.25	1.25	0.0
1968	4	-1.55	13.99	3.63	6.22	10.00	3.33	5.00	0.74	-0.71
1969	1	*****	-10.87	-8.70	-4.35	*****	*****	*****	0.20	0.50
1969	2	-8.20	-8.20	-16.02	-4.30	0.0	-0.95	0.48	-0.95	0.73
1969	3	-0.44	-0.44	-0.44	-0.44	0.0	0.0	0.0	0.0	0.0
1969	4	9.04	9.04	9.04	-1.60	0.0	0.0	1.18	0.0	1.18
1970	1	*****	-10.42	-16.67	-2.08	*****	*****	*****	-0.60	0.88
1970	2	-13.12	-18.44	6.38	4.61	-0.41	1.49	1.35	1.35	0.28
1970	3	-7.41	-11.11	-5.56	-7.41	-0.50	0.25	0.0	0.50	-0.33
1970	4	7.69	2.56	-2.56	12.82	0.67	1.33	-0.67	2.00	6.00
1971	1	*****	10.55	23.12	8.04	*****	*****	*****	-1.19	0.65
1971	2	20.00	34.67	6.67	6.67	-0.73	0.67	0.67	0.81	0.0
1971	3	21.23	20.28	13.21	10.85	0.04	0.38	0.49	0.35	0.18
1971	4	15.17	17.98	17.98	13.48	-0.19	-0.19	0.11	0.0	0.25
1972	1	*****	36.61	25.68	17.49	*****	*****	*****	0.30	0.32
1972	2	46.34	29.27	24.39	21.95	0.37	0.47	0.53	0.17	0.10
1972	3	-18.87	-18.87	-17.22	7.62	0.0	0.09	1.40	0.09	1.44
1972	4	-11.39	-17.72	-0.84	-5.06	-0.56	0.93	0.56	0.95	-5.00
1973	1	*****	-26.69	-26.69	-14.96	*****	*****	*****	0.0	0.44
1973	2	-44.22	-41.18	-29.01	-20.89	0.07	0.34	0.53	0.30	0.28
1973	3	-54.94	-45.41	-44.54	16.98	0.17	0.19	1.31	0.02	1.38
1973	4	-38.84	-35.78	22.32	21.41	0.08	1.57	1.55	1.62	0.04
1974	1	*****	-27.39	-24.92	-24.42	*****	*****	*****	0.09	0.02
1974	2	-36.92	-28.95	-27.62	5.98	0.22	0.25	1.16	0.05	1.22
1974	3	2.01	-4.62	36.35	-1.61	3.30	-17.10	1.80	8.87	1.04
1974	4	-16.80	20.00	-3.47	-24.53	2.19	0.79	-0.46	1.17	-6.08

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-23--FORECAST EVALUATION OF FARM PRICE OF SWEETPOTATOES (DOL./CWT.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - F O R E C A S T - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	6.100	5.350	4.250	4.730
1966	2	5.100	6.950	4.500	5.250	4.860
1966	3	5.500	5.500	5.500	5.000	4.540
1966	4	3.750	4.000	4.000	4.000	4.360
1967	1	4.790	4.900	4.350	5.750	5.660
1967	2	7.250	5.500	7.000	7.000	8.040
1967	3	5.350	5.350	5.350	5.500	4.650
1967	4	4.000	4.000	4.850	4.600	4.250
1968	1	*****	5.750	5.600	5.600	6.390
1968	2	7.500	7.000	7.000	8.000	9.550
1968	3	5.400	5.400	5.400	5.000	5.240
1968	4	4.500	4.500	4.600	4.750	4.960
1969	1	*****	6.500	6.500	6.500	6.700
1969	2	9.000	9.000	9.000	9.000	6.780
1969	3	5.000	5.000	5.000	5.250	4.930
1969	4	4.250	4.250	5.000	4.250	3.970
1970	1	*****	6.750	5.750	6.250	5.840
1970	2	7.500	6.500	6.700	6.900	6.830
1970	3	5.250	5.500	5.600	5.500	4.560
1970	4	4.600	4.750	4.800	3.520	4.200
1971	1	*****	5.900	4.240	5.750	6.460
1971	2	7.200	5.200	6.800	7.750	8.860
1971	3	4.000	4.500	5.000	5.100	6.240
1971	4	3.900	4.500	4.750	4.850	4.960
1972	1	*****	6.600	6.600	6.700	6.880
1972	2	8.750	8.500	8.500	8.900	9.790
1972	3	5.500	5.500	6.100	6.300	6.570
1972	4	4.500	5.200	5.200	5.100	5.490
1973	1	*****	6.900	7.000	7.700	7.990
1973	2	8.800	8.600	9.500	9.750	10.990
1973	3	6.500	6.250	6.500	8.000	8.080
1973	4	5.750	5.750	7.000	6.330	7.010
1974	1	*****	8.500	8.500	8.380	9.600
1974	2	9.750	10.700	10.450	10.550	11.270
1974	3	8.100	8.800	9.240	8.020	8.250
1974	4	7.500	7.680	5.970	6.440	7.850

THEIL-U 0.963 1.118 0.987 0.703

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-24--FORECAST EVALUATION OF FARM PRICE OF SWEETPOTATOES (DOL./CWT.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	* - - - - R E V I S I O N - - - - *				R A T I O - - - - *			
						R1.2	R1.3	R1.4	R2.3	R3.4			
1966	1	*****	28.96	13.11	-10.15	*****	*****	*****	0.55	1.77			
1966	2	4.94	43.00	-7.41	8.02	-7.71	2.50	-0.62	1.17	2.08			
1966	3	21.15	21.15	21.15	10.13	0.0	0.0	0.52	0.0	0.52			
1966	4	-13.99	-8.26	-8.26	-8.26	0.41	0.41	0.41	0.0	0.0			
1967	1	-15.37	-13.43	-23.14	1.59	0.13	-0.51	1.10	-0.72	1.07			
1967	2	-9.83	-31.59	-12.94	-12.94	-2.22	-0.32	-0.32	0.59	0.0			
1967	3	15.05	15.05	15.05	18.28	0.0	0.0	-0.21	0.0	-0.21			
1967	4	-5.88	-5.88	14.12	8.24	0.0	3.40	2.40	3.40	0.42			
1968	1	*****	-10.02	-12.36	-12.36	*****	*****	*****	-0.23	0.0			
1968	2	-21.47	-26.70	-26.70	-16.23	-0.24	-0.24	0.24	0.0	0.39			
1968	3	3.05	3.05	3.05	-4.58	0.0	0.0	2.50	0.0	2.50			
1968	4	-9.27	-9.27	-7.26	-4.23	0.0	0.22	0.54	0.22	0.42			
1969	1	*****	-2.99	-2.99	-2.99	*****	*****	*****	0.0	0.0			
1969	2	32.74	32.74	32.74	32.74	0.0	0.0	0.0	0.0	0.0			
1969	3	1.42	1.42	1.42	6.49	0.0	0.0	-3.57	0.0	-3.57			
1969	4	7.05	7.05	25.94	7.05	0.0	-2.68	0.0	-2.68	0.73			
1970	1	*****	15.58	-1.54	7.02	*****	*****	*****	1.10	5.56			
1970	2	9.81	-4.83	+1.90	1.02	1.49	1.19	0.90	0.61	1.54			
1970	3	15.13	20.61	22.81	20.61	-0.36	-0.51	-0.36	-0.11	0.10			
1970	4	9.52	13.10	14.29	-15.19	-0.37	-0.50	2.70	-0.09	2.13			
1971	1	*****	-8.67	-34.37	-10.99	*****	*****	*****	-2.96	0.68			
1971	2	-18.74	-41.31	-23.25	-12.53	-1.20	-0.24	0.33	0.44	0.46			
1971	3	-35.90	-27.88	-19.87	-18.27	0.22	0.45	0.49	0.29	0.08			
1971	4	-21.37	-9.27	-4.23	-2.22	0.57	0.80	0.90	0.54	0.48			
1972	1	*****	-4.07	-4.07	-2.62	*****	*****	*****	0.0	0.36			
1972	2	-10.62	-13.18	-13.18	-9.09	-0.24	-0.24	0.14	0.0	0.31			
1972	3	-16.29	-16.29	-7.15	-4.11	0.0	0.56	0.75	0.56	0.43			
1972	4	-18.03	-5.28	-5.28	-7.10	0.71	0.71	0.61	0.0	-0.34			
1973	1	*****	-13.64	-12.39	-3.63	*****	*****	*****	0.09	0.71			
1973	2	-19.93	-21.75	-13.56	-11.28	-0.09	0.32	0.43	0.38	0.17			
1973	3	-19.55	-22.65	-19.55	-0.99	-0.16	0.0	0.95	0.14	0.95			
1973	4	-17.97	-17.97	-0.14	-9.70	0.0	0.99	0.46	0.99	-67.00			
1974	1	*****	-11.46	-11.46	-12.71	*****	*****	*****	0.0	-0.11			
1974	2	-13.49	-5.06	-7.28	-6.39	0.62	0.46	0.53	-0.44	0.12			
1974	3	-1.82	6.67	12.00	-2.79	4.67	7.60	-0.53	-0.80	1.23			
1974	4	-4.46	-2.17	-23.95	-17.96	0.51	-4.37	-3.03	-10.06	0.25			

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-25--FORECAST EVALUATION OF FARM PRICE OF DRY EDIBLE BEANS (DOL./CWT.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - F O R E C A S T - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	6.900	8.500	9.100	8.960
1966	2	6.900	8.500	9.000	8.750	8.470
1966	3	8.200	8.500	8.500	8.500	7.970
1966	4	7.000	7.000	7.000	7.000	6.690
1967	1	8.500	7.100	7.100	6.850	7.010
1967	2	7.050	7.200	6.850	7.250	7.290
1967	3	7.050	7.050	7.050	8.700	8.430
1967	4	7.000	7.000	8.800	8.900	9.230
1968	1	*****	8.900	9.000	9.250	9.560
1968	2	9.000	9.250	9.250	9.750	9.510
1968	3	8.400	8.400	8.400	9.250	9.190
1968	4	6.850	7.000	7.650	7.900	8.010
1969	1	*****	7.800	8.000	8.300	8.690
1969	2	8.000	8.200	8.400	8.800	8.590
1969	3	7.800	7.800	7.800	8.800	7.850
1969	4	7.250	7.600	7.800	7.100	7.290
1970	1	*****	7.600	7.100	7.450	7.580
1970	2	7.600	7.500	7.500	7.640	8.190
1970	3	8.000	7.500	7.810	8.600	8.400
1970	4	7.750	7.740	7.600	7.700	8.710
1971	1	*****	7.500	7.650	9.300	9.760
1971	2	7.600	7.700	9.500	10.300	10.500
1971	3	8.150	9.400	9.750	8.200	10.230
1971	4	8.200	8.200	8.700	10.900	11.070
1972	1	*****	9.700	10.750	11.200	11.630
1972	2	10.750	10.750	11.200	11.750	11.600
1972	3	9.750	10.000	11.000	10.000	10.680
1972	4	9.000	10.500	9.600	10.500	9.680
1973	1	*****	9.500	11.000	10.150	10.470
1973	2	9.750	11.000	10.200	11.300	13.000
1973	3	11.000	9.900	10.750	14.750	17.170
1973	4	9.000	9.750	13.000	24.000	26.600
1974	1	*****	13.500	25.000	31.450	40.300
1974	2	14.000	25.000	28.500	41.800	41.210
1974	3	25.000	30.100	30.000	28.690	26.170
1974	4	16.800	16.250	16.250	19.670	21.400
THEIL-U						0.227
		0.952	0.802	0.562		

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-26--FORECAST EVALUATION OF FARM PRICE OF DRY EDIBLE BEANS (DOL./CWT.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	R1.2	R1.3	R1.4	R2.3	R3.4
1966	1	*****	-22.99	-5.13	1.56	*****	*****	*****	0.78	1.30
1966	2	-18.54	0.35	6.26	3.31	1.02	1.34	1.18	-16.67	0.47
1966	3	2.89	6.65	6.65	6.65	-1.30	-1.30	-1.30	0.0	0.0
1966	4	4.63	4.63	4.63	4.63	0.0	0.0	0.0	0.0	0.0
1967	1	21.26	1.28	1.28	-2.28	0.94	0.94	1.11	0.0	2.78
1967	2	-3.29	-1.23	-6.04	-0.55	0.62	-0.83	0.83	-3.89	0.91
1967	3	-16.37	-16.37	-16.37	3.20	0.0	0.0	1.20	0.0	1.20
1967	4	-24.16	-24.16	-4.66	-3.58	0.0	0.81	0.85	0.81	0.23
1968	1	*****	-6.90	-5.86	-3.24	*****	*****	*****	0.15	0.45
1968	2	-5.36	-2.73	-2.73	2.52	0.49	0.49	1.47	0.0	1.92
1968	3	-8.60	-8.60	-8.60	0.65	0.0	0.0	1.08	0.0	1.08
1968	4	-14.48	-12.61	-4.49	-1.37	0.13	0.69	0.91	0.64	0.69
1969	1	*****	-10.24	-7.94	-4.49	*****	*****	*****	0.22	0.43
1969	2	-6.87	-4.54	-2.21	2.44	0.34	0.68	1.36	0.51	2.11
1969	3	-0.64	-0.64	0.64	12.10	0.0	0.0	20.00	0.0	20.00
1969	4	-0.55	4.25	7.00	-2.61	8.75	13.75	-3.75	-0.65	1.37
1970	1	*****	0.26	-6.33	-1.72	*****	*****	*****	25.00	0.73
1970	2	-7.20	-8.42	-8.42	-6.72	-0.17	-0.17	0.07	0.0	0.20
1970	3	-4.76	-10.71	-7.02	2.38	-1.25	-0.47	1.50	0.34	1.34
1970	4	-11.02	-11.14	-12.74	-11.60	-0.01	-0.16	-0.05	-0.14	0.09
1971	1	*****	-23.16	-21.62	-4.71	*****	*****	*****	0.07	0.78
1971	2	-27.62	-26.67	-9.52	-1.90	0.03	0.66	0.93	0.64	0.80
1971	3	-20.33	-8.11	-4.69	-19.84	0.60	0.77	0.02	0.42	-3.23
1971	4	-25.93	-25.93	-21.41	-1.54	0.0	0.17	0.94	0.17	0.93
1972	1	*****	-16.60	-7.57	-3.70	*****	*****	*****	0.54	0.51
1972	2	-7.33	-7.33	-3.45	1.29	0.0	0.53	1.18	0.53	1.37
1972	3	-8.71	-6.37	3.00	-6.37	0.27	1.34	0.27	1.47	3.13
1972	4	-7.02	8.47	-0.83	8.47	2.21	0.88	2.21	1.10	11.25
1973	1	*****	-9.26	5.06	-3.06	*****	*****	*****	1.55	1.60
1973	2	-25.00	-15.38	-21.54	-13.08	0.38	0.14	0.48	-0.40	0.39
1973	3	-35.93	-42.34	-37.39	-14.09	-0.18	-0.04	0.61	0.12	0.62
1973	4	-66.17	-63.35	-51.13	-9.77	0.04	0.23	0.85	0.19	0.81
1974	1	*****	-66.50	-37.97	-21.96	*****	*****	*****	0.43	0.42
1974	2	-66.03	-39.34	-30.84	1.43	0.40	0.53	1.02	0.22	1.05
1974	3	-4.47	15.02	14.64	9.63	4.36	4.27	3.15	0.03	0.34
1974	4	-21.50	-24.07	-24.07	-8.08	-0.12	-0.12	0.62	0.0	0.66

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table B-27--FORECAST EVALUATION: DISTRIBUTION OF REVISION RATIOS
FARM PRICES FOR CROPS

(Continued)

FORECAST REVISION AND VARIABLE		PERCENTAGE OF REVISION RATIOS					STATISTICS		TOTAL	
		1.01- 1.99	.01- .99	1.00- 1.99	OVER 1.99	UNDER 0.00	0.00			
P1.2										
PRICE OF WHEAT (DOL/RU.)		51.72	48.28	3.45	6.90	6.90	34.48	100.00		
PRICE OF RYE (DOL/RU.)		27.59	24.14	3.45	6.90	6.90	58.62	100.00		
PRICE OF RICE (DOL/CWT.)		44.83	37.93	6.90	3.45	20.69	31.03	100.00		
PRICE OF CORN (DOL/RU.)		44.83	41.38	3.45	10.34	24.14	20.69	100.00		
PRICE OF GRAIN SORGHUMS (DOL/CWT.)		44.83	41.38	3.45	10.34	24.14	20.69	100.00		
PRICE OF OATS (DOL/RU.)		44.83	41.38	3.45	6.90	24.14	24.14	100.00		
PRICE OF BARLEY (DOL/RU.)		48.28	44.83	3.45	6.90	31.03	13.79	100.00		
PRICE OF TORACCO (DOL/LR.)		65.52	48.28	17.24	0.00	24.14	10.34	100.00		
PRICE OF PEANUTS (DOL/LR.)		41.38	31.03	10.34	17.24	10.34	31.03	100.00		
PRICE OF SOYBEANS (DOL/RU.)		62.07	55.17	6.90	6.90	10.34	20.69	100.00		
PRICE OF POTATOES (DOL/CWT.)		31.03	27.59	3.45	13.79	24.14	31.03	100.00		
PRICE OF SWEETPOTATOES (DOL/CWT.)		27.59	24.14	3.45	3.45	34.48	34.48	100.00		
PRICE OF DRY EDIBLE BEANS (DOL/CWT.)		41.38	37.93	3.45	10.34	24.14	24.14	100.00		
* * * FORECAST TOTAL * * *		44.30	38.73	5.57	7.96	20.42	27.32	100.00		
P1.3										
PRICE OF WHEAT (DOL/RU.)		79.31	51.72	27.59	0.00	6.90	13.79	100.00		
PRICE OF RYE (DOL/RU.)		55.17	48.28	6.90	3.45	10.34	31.03	100.00		
PRICE OF RICE (DOL/CWT.)		68.97	55.17	13.79	6.90	6.90	17.24	100.00		
PRICE OF CORN (DOL/RU.)		58.62	41.38	17.24	10.34	20.69	10.34	100.00		
PRICE OF GRAIN SORGHUMS (DOL/CWT.)		51.72	41.38	10.34	10.34	17.24	20.69	100.00		
PRICE OF OATS (DOL/RU.)		55.17	41.38	13.79	3.45	17.24	24.14	100.00		
PRICE OF BARLEY (DOL/RU.)		62.07	58.62	3.45	10.34	24.14	3.45	100.00		
PRICE OF TORACCO (DOL/LR.)		79.31	65.52	13.79	6.90	10.34	3.45	100.00		
PRICE OF PEANUTS (DOL/LR.)		55.17	34.48	20.69	20.69	13.79	10.34	100.00		
PRICE OF SOYBEANS (DOL/RU.)		65.52	48.28	17.24	6.90	13.79	13.79	100.00		
PRICE OF POTATOES (DOL/CWT.)		58.62	41.38	17.24	3.45	20.69	17.24	100.00		
PRICE OF SWEETPOTATOES (DOL/CWT.)		37.93	34.48	3.45	10.34	31.03	20.69	100.00		
PRICE OF DRY EDIBLE BEANS (DOL/CWT.)		51.72	44.83	6.90	6.90	27.59	13.79	100.00		
* * * FORECAST TOTAL * * *		59.95	46.68	13.26	7.69	16.98	15.38	100.00		
P1.4										
PRICE OF WHEAT (DOL/RU.)		96.55	62.07	34.48	3.45	0.00	0.00	100.00		
PRICE OF RYE (DOL/RU.)		68.97	41.38	27.59	3.45	3.45	24.14	100.00		
PRICE OF RICE (DOL/CWT.)		75.86	55.17	20.69	6.90	10.34	6.90	100.00		
PRICE OF CORN (DOL/RU.)		86.21	51.72	34.48	3.45	6.90	3.45	100.00		
PRICE OF GRAIN SORGHUMS (DOL/CWT.)		86.21	48.28	37.93	3.45	10.34	0.00	100.00		
PRICE OF OATS (DOL/RU.)		79.31	41.38	37.93	3.45	6.90	10.34	100.00		
PRICE OF BARLEY (DOL/RU.)		75.86	48.28	27.59	3.45	17.24	3.45	100.00		
PRICE OF TORACCO (DOL/LR.)		72.41	48.28	24.14	3.45	13.79	10.34	100.00		
PRICE OF PEANUTS (DOL/LR.)		55.17	24.14	31.03	20.69	3.45	20.69	100.00		
PRICE OF SOYBEANS (DOL/RU.)		89.66	68.97	20.69	3.45	0.00	6.90	100.00		
PRICE OF POTATOES (DOL/CWT.)		62.07	31.03	31.03	6.90	17.24	13.79	100.00		
PRICE OF SWEETPOTATOES (DOL/CWT.)		58.62	55.17	3.45	10.34	24.14	6.90	100.00		
PRICE OF DRY EDIBLE BEANS (DOL/CWT.)		72.41	41.38	31.03	10.34	13.79	3.45	100.00		
* * * FORECAST TOTAL * * *		75.33	47.48	27.85	6.37	9.81	8.49	100.00		

Table B-27--FORECAST EVALUATION: DISTRIBUTION OF REVISION RATIOS
FARM PRICES FOR CROPS (Continued)

R2.3									
PRICE OF WHEAT (DOL/RU.)	65.79	39.47	26.32	2.63	7.89	23.68	100.00		
PRICE OF RYE (DOL/RU.)	47.37	39.47	7.89	0.0	13.16	39.47	100.00		
PRICE OF RICE (DOL/CWT.)	55.26	44.74	10.53	2.63	7.89	34.21	100.00		
PRICE OF CORN (DOL/RU.)	73.68	57.89	15.79	2.63	15.79	7.89	100.00		
PRICE OF GRAIN SORGHUMS (DOL/CWT.)	55.26	50.00	5.26	10.53	26.32	7.89	100.00		
PRICE OF OATS (DOL/RU.)	55.26	47.37	7.89	7.89	21.05	15.79	100.00		
PRICE OF BARLEY (DOL/RU.)	65.79	60.53	5.26	5.26	15.79	13.16	100.00		
PRICE OF TORACCO (DOL/LR.)	63.16	47.37	15.79	10.53	15.79	10.53	100.00		
PRICE OF PEANUTS (DOL/LR.)	36.84	23.68	13.16	5.26	23.68	34.21	100.00		
PRICE OF SOYBEANS (DOL/RU.)	57.89	44.74	13.16	10.53	21.05	10.53	100.00		
PRICE OF POTATOES (DOL/CWT.)	55.26	42.11	13.16	5.26	15.79	23.68	100.00		
PRICE OF SWEETPOTATOES (DOL/CWT.)	42.11	36.84	5.26	2.63	23.68	31.56	100.00		
PRICE OF DRY EDIBLE BEANS (DOL/CWT.)	57.89	50.00	7.89	2.63	15.79	23.68	100.00		
* * * FORECAST TOTAL * * *	56.28	44.74	11.34	5.26	17.21	21.26	100.00		
R3.4									
PRICE OF WHEAT (DOL/RU.)	68.42	44.74	23.68	0.0	13.16	18.42	100.00		
PRICE OF RYE (DOL/RU.)	55.26	39.47	15.79	5.26	10.53	28.95	100.00		
PRICE OF RICE (DOL/CWT.)	50.00	39.47	10.53	15.79	5.26	28.95	100.00		
PRICE OF CORN (DOL/RU.)	81.58	71.05	10.53	2.63	7.89	7.89	100.00		
PRICE OF GRAIN SORGHUMS (DOL/CWT.)	71.05	39.47	31.58	10.53	10.53	7.89	100.00		
PRICE OF OATS (DOL/RU.)	68.42	36.84	31.58	5.26	5.26	21.05	100.00		
PRICE OF BARLEY (DOL/RU.)	71.05	57.89	13.16	10.53	13.16	5.26	100.00		
PRICE OF TORACCO (DOL/LR.)	65.79	36.84	28.95	5.26	23.68	5.26	100.00		
PRICE OF PEANUTS (DOL/LR.)	42.11	26.32	15.79	5.26	7.89	44.74	100.00		
PRICE OF SOYBEANS (DOL/RU.)	73.68	63.16	10.53	7.89	10.53	7.89	100.00		
PRICE OF POTATOES (DOL/CWT.)	60.53	47.37	13.16	10.53	15.79	13.16	100.00		
PRICE OF SWEETPOTATOES (DOL/CWT.)	63.16	52.63	10.53	10.53	13.16	13.16	100.00		
PRICE OF DRY EDIBLE BEANS (DOL/CWT.)	76.32	52.63	23.68	15.79	2.63	5.26	100.00		
* * * FORECAST TOTAL * * *	65.18	46.76	18.42	0.10	10.73	15.99	100.00		

Table B-28--FORECAST EVALUATION: SUMMARY OF PERCENT ERROR AND THEIL-U STATISTIC FOR THE PERIOD
FOR FARM PRICES FOR CROPS

FORECAST REVISION AND VARIABLE					PERCENT ERROR RANGE		UNDER-EST.		OVER-EST.		THEIL-U	
AVERAGE					LOW	HIGH	EST.	%	EST.	%	U	U2
FORECAST PERIOD 1												
PRICE OF WHEAT (DOL/RU.)	18.91	0.78	63.64	75.86	24.14	1.283						
PRICE OF RYE (DOL/RU.)	16.37	0.0	58.99	58.62	37.93	1.410						
PRICE OF RICE (DOL/CWT.)	13.45	0.57	63.84	82.76	17.24	1.080						
PRICE OF CORN (DOL/RU.)	16.74	0.85	59.22	72.41	27.59	1.285						
PRICE OF GRAIN SORGHUMS (DOL/CWT.)	13.41	0.56	53.98	72.41	27.59	1.288						
PRICE OF OATS (DOL/RU.)	13.71	0.43	51.48	62.07	37.93	1.308						
PRICE OF BARLEY (DOL/RU.)	15.06	0.23	55.66	68.97	31.03	1.300						
PRICE OF TOBACCO (DOL/LR.)	3.85	0.0	14.68	79.31	17.24	0.715						
PRICE OF PEANUTS (DOL/LR.)	2.69	0.0	7.98	65.52	20.69	0.521						
PRICE OF SOYBEANS (DOL/RU.)	17.71	0.39	64.41	62.07	37.93	1.135						
PRICE OF POTATOES (DOL/CWT.)	16.90	0.44	54.94	62.07	37.93	0.805						
PRICE OF SWEETPOTATOES (DOL/CWT.)	14.66	1.42	35.90	65.52	34.48	1.123						
PRICE OF DRY EDIBLE BEANS (DOL/CWT.)	16.17	0.55	66.17	85.21	13.79	0.796						
FORECAST PERIOD 2												
PRICE OF WHEAT (DOL/RU.)	15.55	0.27	63.64	68.42	31.58	1.063						
PRICE OF RYE (DOL/RU.)	13.94	0.0	64.55	50.00	47.37	1.172						
PRICE OF RICE (DOL/CWT.)	11.91	0.0	63.32	81.58	15.79	0.950						
PRICE OF CORN (DOL/RU.)	15.89	0.0	50.75	65.79	28.95	1.102						
PRICE OF GRAIN SORGHUMS (DOL/CWT.)	12.40	0.56	49.88	81.58	18.42	1.153						
PRICE OF OATS (DOL/RU.)	11.61	0.16	49.70	68.42	31.58	1.055						
PRICE OF BARLEY (DOL/RU.)	13.16	0.45	54.13	60.53	39.47	1.098						
PRICE OF TOBACCO (DOL/LR.)	2.97	0.0	14.20	76.32	21.05	0.569						
PRICE OF PEANUTS (DOL/LR.)	2.64	0.0	6.67	55.26	31.58	0.488						
PRICE OF SOYBEANS (DOL/RU.)	15.38	0.39	78.92	65.79	34.21	1.132						
PRICE OF POTATOES (DOL/CWT.)	19.34	0.44	45.41	63.16	36.84	0.684						
PRICE OF SWEETPOTATOES (DOL/CWT.)	15.81	1.42	43.00	68.42	31.58	1.311						
PRICE OF DRY EDIBLE BEANS (DOL/CWT.)	15.21	0.26	66.50	76.32	23.68	0.606						
FORECAST PERIOD 3												
PRICE OF WHEAT (DOL/RU.)	11.67	0.0	55.84	60.53	34.21	0.737						
PRICE OF RYE (DOL/RU.)	11.15	0.0	56.68	50.00	44.74	0.921						
PRICE OF RICE (DOL/CWT.)	8.91	0.0	59.03	76.95	18.42	0.740						
PRICE OF CORN (DOL/RU.)	11.89	0.0	44.10	57.89	36.84	0.760						
PRICE OF GRAIN SORGHUMS (DOL/CWT.)	10.34	0.51	39.77	71.05	28.95	0.860						
PRICE OF OATS (DOL/RU.)	8.78	0.15	40.20	57.89	42.11	0.675						
PRICE OF BARLEY (DOL/RU.)	9.83	0.53	44.62	60.53	39.47	0.748						
PRICE OF TOBACCO (DOL/LR.)	1.94	0.0	12.30	71.05	26.32	0.411						
PRICE OF PEANUTS (DOL/LR.)	2.73	0.0	10.00	42.11	50.00	0.508						
PRICE OF SOYBEANS (DOL/RU.)	11.43	0.0	60.03	55.26	39.47	0.872						
PRICE OF POTATOES (DOL/CWT.)	16.46	0.44	44.54	55.26	44.74	0.635						
PRICE OF SWEETPOTATOES (DOL/CWT.)	13.82	0.14	34.37	71.05	28.95	1.094						
PRICE OF DRY EDIBLE BEANS (DOL/CWT.)	11.48	0.54	51.13	76.32	23.68	0.468						
FORECAST PERIOD 4												
PRICE OF WHEAT (DOL/RU.)	5.79	0.0	35.06	60.53	31.58	0.325						
PRICE OF RYE (DOL/RU.)	6.62	0.0	48.57	63.16	34.21	0.450						
PRICE OF RICE (DOL/CWT.)	5.66	0.0	41.30	73.08	23.68	0.393						
PRICE OF CORN (DOL/RU.)	5.53	0.0	21.40	57.89	36.84	0.334						
PRICE OF GRAIN SORGHUMS (DOL/CWT.)	4.64	0.0	25.03	50.00	42.11	0.352						
PRICE OF OATS (DOL/RU.)	4.32	0.15	18.79	68.42	31.58	0.256						
PRICE OF BARLEY (DOL/RU.)	5.15	0.0	18.97	65.79	28.95	0.339						
PRICE OF TOBACCO (DOL/LR.)	1.04	0.0	5.44	37.93	31.58	0.218						
PRICE OF PEANUTS (DOL/LR.)	1.75	0.0	6.32	31.58	20.69	0.367						
PRICE OF SOYBEANS (DOL/RU.)	4.63	0.0	24.36	65.79	31.58	0.303						
PRICE OF POTATOES (DOL/CWT.)	13.30	0.44	74.20	47.37	28.95	0.515						
PRICE OF SWEETPOTATOES (DOL/CWT.)	9.64	0.49	32.74	71.05	28.95	0.791						
PRICE OF DRY EDIBLE BEANS (DOL/CWT.)	5.42	0.55	21.96	57.89	42.11	0.191						

Table C-1--FORECAST EVALUATION OF FARM PRICE OF BFFF CATTLE (DOL./CWT.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - - F O R E C A S T - - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	19.500	19.800	20.500	22.430
1966	2	19.000	20.100	21.500	22.000	23.030
1966	3	21.000	22.500	22.500	22.750	22.270
1966	4	22.000	22.000	23.250	22.500	21.270
1967	1	23.500	23.750	23.500	23.000	21.670
1967	2	24.250	24.000	24.000	22.000	22.370
1967	3	24.500	24.500	22.500	23.200	23.170
1967	4	25.000	22.750	23.000	22.800	21.800
1968	1	*****	23.500	23.000	22.500	22.730
1968	2	24.000	22.500	22.500	22.600	23.700
1968	3	23.500	23.250	23.800	23.800	23.830
1968	4	23.000	23.300	23.300	22.800	23.170
1969	1	*****	23.500	22.500	23.000	24.500
1969	2	23.500	23.000	23.200	24.500	28.230
1969	3	23.500	23.500	24.700	28.250	26.970
1969	4	23.500	24.100	27.750	25.100	25.300
1970	1	*****	27.500	25.500	26.000	27.600
1970	2	28.000	26.000	26.500	28.500	28.230
1970	3	27.000	27.200	28.500	28.500	27.330
1970	4	26.500	26.500	26.500	26.500	25.330
1971	1	*****	27.000	27.000	26.000	27.930
1971	2	28.000	27.500	26.500	28.300	29.170
1971	3	28.000	27.500	27.700	28.200	29.000
1971	4	26.500	27.200	27.500	27.500	29.830
1972	1	*****	28.000	28.500	30.000	32.400
1972	2	28.500	29.000	29.750	30.000	33.330
1972	3	28.000	29.500	30.000	34.000	34.070
1972	4	29.000	29.500	32.250	33.000	34.070
1973	1	*****	32.500	33.000	35.000	40.400
1973	2	33.500	33.500	35.000	39.000	43.200
1973	3	34.000	34.000	37.000	44.000	47.700
1973	4	33.500	35.000	46.000	41.000	40.000
1974	1	*****	45.000	43.000	45.000	42.800
1974	2	45.000	40.000	46.000	42.000	36.400
1974	3	39.000	43.000	42.000	42.000	35.000
1974	4	40.000	40.000	39.000	32.000	28.800

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table C-2--FORECAST EVALUATION OF FARM PRICE OF BEEF CATTLE (DOL./CWT.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	* - - P E R C E N T E R R O R - - - *				* - - - - R E V I S I O N R A T I O - - - *				
		1ST	2ND	3RD	4TH	R1.2	R1.3	R1.4	R2.3	R3.4
1966	1	*****	-13.06	-11.73	-8.60	*****	*****	*****	0.10	0.27
1966	2	-17.50	-12.72	-6.64	-4.47	0.27	0.62	0.74	0.48	0.33
1966	3	-5.70	1.03	1.03	2.16	1.18	1.18	1.38	0.0	-1.09
1966	4	3.43	3.43	9.31	5.78	0.0	-1.71	-0.68	-1.71	0.38
1967	1	8.44	9.60	8.44	6.14	-0.14	0.0	0.27	0.12	0.27
1967	2	8.40	7.29	7.29	-1.65	0.13	0.13	1.20	0.0	1.23
1967	3	5.74	5.74	-2.89	0.13	0.0	1.50	0.98	1.50	1.04
1967	4	14.68	4.36	5.50	4.59	0.70	0.63	0.69	-0.26	0.17
1968	1	*****	3.39	1.19	-1.01	*****	*****	*****	0.65	1.85
1968	2	1.27	-5.06	-5.06	-4.64	5.00	5.00	4.67	0.0	0.08
1968	3	-1.38	-2.43	-0.13	-0.13	-0.76	0.91	0.91	0.95	0.0
1968	4	-0.73	0.56	0.56	-1.60	1.76	1.76	-1.18	0.0	3.85
1969	1	*****	-4.08	-8.16	-6.12	*****	*****	*****	-1.00	0.25
1969	2	-16.76	-18.53	-17.82	-13.21	-0.11	-0.06	0.21	0.04	0.26
1969	3	-12.87	-12.87	-8.42	4.75	0.0	0.35	1.37	0.35	1.56
1969	4	-7.11	-4.74	9.68	-0.79	0.33	2.36	0.89	3.04	1.08
1970	1	*****	-0.36	-7.61	-5.80	*****	*****	*****	-20.00	0.24
1970	2	-0.81	-7.90	-6.13	0.96	-8.70	-6.52	2.17	0.22	1.16
1970	3	-1.21	-0.48	4.28	4.28	0.61	4.55	4.55	10.00	0.0
1970	4	4.62	4.62	4.62	4.62	0.0	0.0	0.0	0.0	0.0
1971	1	*****	-3.33	-3.33	-6.91	*****	*****	*****	0.0	-1.08
1971	2	-4.01	-5.73	-9.15	-2.98	-0.43	-1.28	0.26	-0.60	0.67
1971	3	-3.45	-5.17	-4.48	-2.76	-0.50	-0.30	0.20	0.13	0.38
1971	4	-11.16	-8.82	-7.81	-7.81	0.21	0.30	0.30	0.11	0.0
1972	1	*****	-13.58	-12.04	-7.41	*****	*****	*****	0.11	0.38
1972	2	-14.49	-12.99	-10.74	-9.99	0.10	0.26	0.31	0.17	0.07
1972	3	-17.82	-13.41	-11.95	-0.21	0.25	0.33	0.99	0.11	0.98
1972	4	-14.88	-13.41	-5.34	-3.14	0.10	0.64	0.79	0.60	0.41
1973	1	*****	-19.55	-18.32	-13.37	*****	*****	*****	0.06	0.27
1973	2	-22.45	-22.45	-18.98	-9.72	0.0	0.15	0.57	0.15	0.49
1973	3	-28.72	-28.72	-22.43	-7.76	0.0	0.22	0.73	0.22	0.65
1973	4	-16.25	-12.50	15.00	2.50	0.23	1.92	1.15	2.20	0.83
1974	1	*****	5.14	0.47	5.14	*****	*****	*****	0.91	-10.00
1974	2	23.63	9.89	26.37	15.38	0.58	-0.12	0.35	-1.67	0.42
1974	3	11.43	22.86	20.00	20.00	-1.00	-0.75	-0.75	0.13	0.0
1974	4	38.89	38.89	35.42	11.11	0.0	0.09	0.71	0.09	0.69

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table C-3-- FORECAST EVALUATION OF FARM PRICE OF LAMBS (DOL./CWT.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - - F O R E C A S T - - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	22.000	21.800	23.000	26.000
1966	2	23.000	23.600	24.000	24.500	23.930
1966	3	22.700	23.200	23.750	23.500	22.500
1966	4	22.800	23.500	23.250	22.300	21.830
1967	1	24.500	24.000	24.000	24.000	20.900
1967	2	24.500	24.750	24.750	24.000	23.300
1967	3	24.250	24.250	23.500	23.250	22.630
1967	4	23.750	23.000	22.750	22.200	21.830
1968	1	*****	23.200	22.500	22.000	23.400
1968	2	24.500	24.000	23.500	24.000	25.600
1968	3	23.000	23.000	23.200	24.600	24.370
1968	4	22.500	22.500	23.500	23.000	24.430
1969	1	*****	23.600	23.500	24.000	26.430
1969	2	25.500	25.800	25.800	27.300	27.900
1969	3	25.000	25.000	26.000	27.500	27.400
1969	4	24.500	25.700	26.250	27.000	27.370
1970	1	*****	26.500	27.500	27.700	27.830
1970	2	27.750	28.500	28.500	25.500	26.770
1970	3	27.500	27.800	25.500	27.250	26.630
1970	4	27.600	23.000	26.750	27.000	24.900
1971	1	*****	27.000	27.500	24.500	24.170
1971	2	28.000	27.500	26.000	26.500	27.300
1971	3	27.300	26.000	26.000	27.000	26.800
1971	4	25.500	25.000	27.000	27.000	25.330
1972	1	*****	27.500	27.500	25.500	27.930
1972	2	28.000	28.000	27.500	28.000	29.900
1972	3	27.500	27.000	27.500	29.500	30.230
1972	4	26.000	26.500	28.200	29.000	28.170
1973	1	*****	28.500	29.000	29.500	35.670
1973	2	30.000	30.000	30.500	34.500	35.130
1973	3	30.000	30.000	33.500	37.000	36.800
1973	4	28.500	30.500	36.000	32.000	33.900
1974	1	*****	36.000	35.000	38.000	38.200
1974	2	38.000	34.000	37.000	37.000	40.400
1974	3	33.000	35.000	35.000	35.000	36.200
1974	4	34.000	34.000	34.000	34.000	34.800

THEIL-U 0.908 0.877 0.723 0.540

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table C-4-- FORECAST EVALUATION OF FARM PRICE OF LAMBS (DOL./CWT.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	* - - P E R C E N T E R R O R - - - *				* - - - R E V I S I O N R A T I O - - - *				
		1ST	2ND	3RD	4TH	R1.2	R1.3	R1.4	R2.3	R3.4
1966	1	*****	-15.38	-16.15	-11.54	*****	*****	*****	-0.05	0.29
1966	2	-3.89	-1.38	0.29	2.38	0.65	1.08	1.61	1.21	-7.14
1966	3	0.89	3.11	5.56	4.44	-2.50	-5.25	-4.00	-0.79	0.20
1966	4	4.44	7.65	6.50	2.15	-0.72	-0.46	0.52	0.15	0.67
1967	1	17.22	14.83	14.83	14.83	0.14	0.14	0.14	0.0	0.0
1967	2	5.15	6.22	6.22	3.00	-0.21	-0.21	0.42	0.0	0.52
1967	3	7.16	7.16	3.84	2.74	0.0	0.46	0.62	0.46	0.29
1967	4	8.80	5.36	4.21	1.69	0.39	0.52	0.81	0.21	0.60
1968	1	*****	-0.85	-3.85	-5.98	*****	*****	*****	-3.50	-0.56
1968	2	-4.30	-6.25	-8.20	-6.25	-0.45	-0.91	-0.45	-0.31	0.24
1968	3	-5.62	-5.62	-4.80	0.94	0.0	0.15	1.17	0.15	1.20
1968	4	-7.90	-7.90	-3.81	-5.85	0.0	0.52	0.26	0.52	-0.54
1969	1	*****	-10.71	-11.09	-9.19	*****	*****	*****	-0.04	0.17
1969	2	-8.60	-7.53	-7.53	-2.15	0.13	0.13	0.75	0.0	0.71
1969	3	-8.76	-8.76	-5.11	0.36	0.0	0.42	1.04	0.42	1.07
1969	4	-10.49	-6.10	-4.09	-1.35	0.42	0.61	0.87	0.33	0.67
1970	1	*****	-4.78	-1.19	-0.47	*****	*****	*****	0.75	0.61
1970	2	3.66	6.46	6.46	-4.74	-0.77	-0.77	2.30	0.0	1.73
1970	3	3.27	4.39	-4.24	2.33	-0.34	2.30	0.29	1.97	1.55
1970	4	10.84	-7.63	7.43	8.43	1.70	0.31	0.22	1.97	-0.14
1971	1	*****	11.71	13.78	1.37	*****	*****	*****	-0.18	0.90
1971	2	2.56	0.73	-4.76	-2.93	0.71	2.86	2.14	7.50	0.38
1971	3	1.87	-2.99	-2.99	0.75	2.60	2.60	0.60	0.0	1.25
1971	4	0.67	-1.30	6.59	6.59	2.94	-8.82	-8.82	6.06	0.0
1972	1	*****	-1.54	-1.54	-8.70	*****	*****	*****	0.0	-4.65
1972	2	-6.35	-6.35	-8.03	-6.35	0.0	-0.26	0.0	-0.26	0.21
1972	3	-9.03	-10.68	-9.03	-2.41	-0.18	0.0	0.73	0.15	0.73
1972	4	-7.70	-5.93	0.11	2.95	0.23	1.01	1.38	1.02	-26.67
1973	1	*****	-20.10	-18.70	-17.30	*****	*****	*****	0.07	0.07
1973	2	-14.60	-14.60	-13.18	-1.79	0.0	0.10	0.88	0.10	0.86
1973	3	-18.48	-18.48	-8.97	0.54	0.0	0.51	1.03	0.51	1.06
1973	4	-15.93	-10.03	6.19	-5.60	0.37	1.39	0.65	1.62	1.90
1974	1	*****	-5.76	-8.38	-0.52	*****	*****	*****	-0.45	0.94
1974	2	-5.94	-15.84	-8.42	-8.42	-1.67	-0.42	-0.42	0.47	0.0
1974	3	-8.84	-3.31	-3.31	-3.31	0.63	0.63	0.63	0.0	0.0
1974	4	-2.30	-2.30	-2.30	-2.30	0.0	0.0	0.0	0.0	0.0

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table C-5-- FORECAST EVALUATION OF FARM PRICE OF HOGS (DOL./CWT.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - F O R E C A S T - - - - *						
YEAR	QUARTR	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	18.750	21.000	24.000	26.170
1966	2	21.000	21.400	24.000	23.500	22.530
1966	3	23.200	23.500	22.750	22.500	23.330
1966	4	21.000	19.500	19.000	20.750	19.800
1967	1	22.250	17.250	21.250	20.200	18.600
1967	2	17.000	22.000	21.300	20.000	19.870
1967	3	22.000	22.500	21.500	21.750	20.330
1967	4	20.600	19.500	20.200	18.500	17.270
1968	1	*****	20.750	19.000	17.500	18.370
1968	2	21.500	20.000	18.500	20.000	18.730
1968	3	21.000	20.000	20.800	20.200	19.830
1968	4	17.500	18.600	18.500	17.800	17.730
1969	1	*****	18.000	17.800	18.000	19.430
1969	2	18.500	18.000	18.200	20.200	22.000
1969	3	19.000	19.000	20.700	24.000	25.230
1969	4	17.000	18.000	22.250	23.500	25.200
1970	1	*****	21.500	23.200	25.000	26.500
1970	2	21.500	23.600	25.500	25.500	23.330
1970	3	24.000	26.000	25.500	23.750	21.700
1970	4	24.000	23.000	18.000	18.500	16.130
1971	1	*****	18.500	18.800	16.000	17.100
1971	2	19.000	19.000	16.500	17.500	16.800
1971	3	20.300	19.000	19.500	19.500	18.470
1971	4	18.000	18.200	18.000	17.800	19.330
1972	1	*****	19.500	19.500	20.500	23.900
1972	2	19.500	19.500	20.500	23.500	24.330
1972	3	20.500	22.500	25.000	26.500	27.870
1972	4	20.000	22.500	23.500	26.000	27.900
1973	1	*****	24.500	25.500	29.000	34.500
1973	2	25.000	25.500	28.500	32.000	35.830
1973	3	26.000	27.500	29.000	42.000	47.100
1973	4	24.500	26.000	44.000	39.000	39.900
1974	1	*****	42.000	40.000	41.000	38.100
1974	2	42.000	37.000	42.000	32.500	27.000
1974	3	38.000	43.000	35.500	33.000	34.600
1974	4	38.000	32.500	31.000	36.000	37.400
THEIL-U						0.314
0.992						0.724
0.870						0.314

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table C-6-- FORECAST EVALUATION OF FARM PRICE OF HOGS (DOL./CWT.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	* - - - - -	R1.2	R1.3	R1.4	R2.3	R3.4	* - - - - *
1966	1	*****	-28.35	-19.76	-8.29	*****	*****	*****	*****	0.30	0.58	
1966	2	-6.79	-5.02	6.52	4.31	*****	0.26	1.96	1.63	2.30	0.34	
1966	3	-0.56	0.73	-2.49	-3.56	*****	2.31	-3.46	-5.38	4.41	-0.43	
1966	4	6.06	-1.52	-4.04	4.80	*****	1.25	1.67	0.21	-1.67	2.19	
1967	1	19.62	-7.26	14.25	8.60	*****	1.37	0.27	0.56	2.96	0.40	
1967	2	-14.44	10.72	7.20	0.65	*****	1.74	1.50	1.05	0.33	0.91	
1967	3	8.21	10.67	5.76	6.98	*****	-0.30	0.30	0.15	0.46	-0.21	
1967	4	19.28	12.91	16.97	7.12	*****	0.33	0.12	0.63	-0.31	0.58	
1968	1	*****	12.96	3.43	-4.74	*****	*****	*****	*****	0.74	2.38	
1968	2	14.79	6.78	-1.23	6.78	*****	0.54	1.08	0.54	1.18	6.52	
1968	3	5.90	0.86	4.89	1.87	*****	0.85	0.17	0.68	-4.71	0.02	
1968	4	-1.30	4.91	4.34	0.39	*****	4.78	4.35	1.30	0.11	0.91	
1969	1	*****	-7.36	-8.39	-7.36	*****	*****	*****	*****	-0.14	0.12	
1969	2	-15.91	-18.18	-17.27	-8.18	*****	-0.14	-0.09	0.49	0.05	0.53	
1969	3	-24.69	-24.69	-17.95	-4.88	*****	0.0	0.27	0.80	0.27	0.73	
1969	4	-32.54	-28.57	-11.71	-6.75	*****	0.12	0.64	0.79	0.59	0.42	
1970	1	*****	-18.87	-12.45	-5.66	*****	*****	*****	*****	0.34	0.55	
1970	2	-7.84	1.16	9.30	9.30	*****	1.15	2.19	2.19	-7.04	0.0	
1970	3	10.60	19.82	17.51	9.45	*****	-0.87	-0.65	0.11	0.12	0.46	
1970	4	48.79	42.59	11.59	14.69	*****	0.13	0.76	0.70	0.73	-0.27	
1971	1	*****	8.19	9.94	-6.43	*****	*****	*****	*****	-0.21	1.65	
1971	2	13.10	13.10	-1.79	4.17	*****	0.0	1.14	0.68	1.14	3.33	
1971	3	9.91	2.87	5.58	5.58	*****	0.71	0.44	0.44	-0.94	0.0	
1971	4	-6.88	-5.85	-6.88	-7.92	*****	0.15	0.0	-0.15	-0.18	-0.15	
1972	1	*****	-18.41	-18.41	-14.23	*****	*****	*****	*****	0.0	0.23	
1972	2	-19.85	-19.85	-15.74	-3.41	*****	0.0	0.21	0.83	0.21	0.78	
1972	3	-26.44	-19.27	-10.30	-4.92	*****	0.27	0.61	0.81	0.47	0.52	
1972	4	-28.32	-19.35	-15.77	-6.81	*****	0.32	0.44	0.76	0.19	0.57	
1973	1	*****	-28.99	-26.09	-15.94	*****	*****	*****	*****	0.10	0.39	
1973	2	-30.23	-28.83	-20.46	-10.69	*****	0.05	0.32	0.65	0.29	0.48	
1973	3	-44.80	-41.61	-38.43	-10.83	*****	0.07	0.14	0.76	0.08	0.72	
1973	4	-38.60	-34.84	10.28	-2.26	*****	0.10	1.27	0.94	1.29	1.22	
1974	1	*****	10.24	4.99	7.61	*****	*****	*****	*****	0.51	-0.53	
1974	2	55.56	37.04	55.56	20.37	*****	0.33	0.0	0.63	-0.50	0.63	
1974	3	9.83	24.28	2.60	-4.62	*****	-1.47	0.74	1.47	0.89	2.78	
1974	4	1.60	-13.10	-17.11	-3.74	*****	9.17	11.67	3.33	-0.31	0.78	

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table C-7-- FORECAST EVALUATION OF FARM PRICE OF WHOLESALE MILK (DOL./CWT.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* * * * * F O R E C A S T * * * * *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	4.000	4.350	4.390	4.580
1966	2	4.280	4.000	4.020	4.360	4.400
1966	3	4.250	4.300	4.600	5.050	5.000
1966	4	4.670	4.900	5.420	5.300	5.340
1967	1	4.600	4.930	5.100	5.100	5.080
1967	2	4.600	4.700	4.700	4.700	4.740
1967	3	4.950	5.000	5.000	5.000	4.990
1967	4	5.350	5.350	5.350	5.250	5.320
1968	1	*****	5.050	5.050	5.100	5.170
1968	2	4.750	4.750	4.750	5.050	4.980
1968	3	5.000	5.000	5.350	5.300	5.260
1968	4	5.300	5.650	5.650	5.620	5.640
1969	1	*****	5.450	5.450	5.450	5.490
1969	2	5.100	5.100	5.100	5.100	5.200
1969	3	5.350	5.350	5.350	5.450	5.440
1969	4	5.700	5.700	5.850	5.700	5.890
1970	1	*****	5.600	5.450	5.650	5.740
1970	2	5.300	5.100	5.280	5.450	5.450
1970	3	5.300	5.500	5.620	5.550	5.620
1970	4	5.820	5.900	5.850	5.900	6.060
1971	1	*****	5.650	5.700	5.800	5.940
1971	2	5.400	5.400	5.500	5.770	5.620
1971	3	5.650	5.700	5.950	5.800	5.790
1971	4	6.050	6.380	6.200	6.120	6.150
1972	1	*****	6.050	6.050	6.000	6.080
1972	2	6.000	5.700	5.700	5.750	5.780
1972	3	5.900	5.900	5.850	5.950	6.010
1972	4	6.200	6.200	6.280	6.370	6.480
1973	1	*****	6.150	6.250	6.450	6.540
1973	2	5.850	5.900	6.100	6.250	6.380
1973	3	6.050	6.250	6.400	6.650	7.190
1973	4	6.570	6.600	7.000	8.180	8.590
1974	1	*****	6.900	8.250	8.750	8.910
1974	2	6.650	7.950	8.450	8.400	8.270
1974	3	8.100	8.550	8.600	7.550	7.770
1974	4	8.850	8.900	8.350	8.350	8.310

THEIL-U 0.923 0.796 0.531 0.208

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table - C-8--FORECAST EVALUATION OF FARM PRICE OF WHOLESALE MILK (DOL./CWT.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

		* - - P E R C E N T E R R O R - - - *				* - - - - R E V I S I O N R A T I O - - - *				
YEAR	QUARTER	1ST	2ND	3RD	4TH	R1.2	R1.3	R1.4	R2.3	R3.4
1966	1	*****	-12.66	-5.02	-4.15	*****	*****	*****	0.60	0.17
1966	2	-2.73	-9.09	-8.64	-0.91	-2.33	-2.17	0.67	0.05	0.89
1966	3	-15.00	-14.00	-8.00	1.00	0.07	0.47	1.07	0.43	1.13
1966	4	-12.55	-8.24	1.50	-0.75	0.34	1.12	0.94	1.18	1.50
1967	1	-9.45	-2.95	0.39	0.39	0.69	1.04	1.04	1.13	0.0
1967	2	-2.95	-0.84	-0.84	-0.84	0.71	0.71	0.71	0.0	0.0
1967	3	-0.80	0.20	0.20	0.20	1.25	1.25	1.25	0.0	0.0
1967	4	0.56	0.56	0.56	-1.32	0.0	0.0	3.33	0.0	3.33
1968	1	*****	-2.32	-2.32	-1.35	*****	*****	*****	0.0	0.42
1968	2	-4.62	-4.62	-4.62	1.41	0.0	0.0	1.30	0.0	1.30
1968	3	-4.94	-4.94	1.71	0.76	0.0	1.35	1.15	1.35	0.56
1968	4	-6.03	0.18	0.18	-0.35	1.03	1.03	0.94	0.0	3.00
1969	1	*****	-0.73	-0.73	-0.73	*****	*****	*****	0.0	0.0
1969	2	-1.92	-1.92	-1.92	-1.92	0.0	0.0	0.0	0.0	0.0
1969	3	-1.65	-1.65	-1.65	0.18	0.0	0.0	1.11	0.0	1.11
1969	4	-3.23	-3.23	-0.68	-3.23	0.0	0.79	0.0	0.79	-3.75
1970	1	*****	-2.44	-5.05	-1.57	*****	*****	*****	-1.07	0.69
1970	2	-2.75	-6.42	-3.12	0.0	-1.33	-0.13	1.00	0.51	1.00
1970	3	-5.69	-2.14	0.0	-1.25	0.63	1.00	0.78	1.00	-7.00
1970	4	-3.96	-2.64	-3.47	-2.64	0.33	0.13	0.33	-0.31	0.24
1971	1	*****	-4.88	-4.04	-2.36	*****	*****	*****	0.17	0.42
1971	2	-3.91	-3.91	+2.14	2.67	0.0	0.45	1.68	0.45	2.25
1971	3	-2.42	-1.55	2.76	0.17	0.36	2.14	1.07	2.78	0.94
1971	4	-1.63	3.74	0.81	-0.49	3.30	1.50	0.70	0.78	1.60
1972	1	*****	-0.49	-0.49	-1.32	*****	*****	*****	0.0	-1.67
1972	2	3.81	-1.38	+1.38	-0.52	1.36	1.36	1.14	0.0	0.63
1972	3	-1.83	-1.83	-2.64	-1.00	0.0	-0.45	0.45	-0.45	0.62
1972	4	-4.32	-4.32	-3.09	-1.70	0.0	0.29	0.61	0.29	0.45
1973	1	*****	-5.96	-4.43	-1.38	*****	*****	*****	0.26	0.69
1973	2	-8.31	-7.52	-4.39	-2.04	0.09	0.47	0.75	0.42	0.54
1973	3	-15.86	-13.07	-10.99	-7.51	0.18	0.31	0.53	0.16	0.32
1973	4	-23.52	-23.17	-18.51	-4.77	0.01	0.21	0.80	0.20	0.74
1974	1	*****	-22.56	-7.41	-1.80	*****	*****	*****	0.67	0.76
1974	2	-19.59	-3.87	2.18	1.57	0.80	1.11	1.08	1.56	0.28
1974	3	4.25	10.04	10.68	-2.83	-1.36	-1.52	1.67	-0.06	1.27
1974	4	6.50	7.10	0.48	0.48	-0.09	0.93	0.93	0.93	0.0

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table C-9--FORECAST EVALUATION OF FARM PRICE OF MILKFAT IN CREAM (DOL./LB.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - - F O R E C A S T - - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	0.610	0.594	0.615	0.633
1966	2	0.594	0.603	0.600	0.616	0.642
1966	3	0.605	0.608	0.620	0.697	0.718
1966	4	0.620	0.630	0.730	0.700	0.704
1967	1	0.622	0.680	0.680	0.685	0.680
1967	2	0.665	0.670	0.675	0.650	0.675
1967	3	0.680	0.690	0.675	0.655	0.682
1967	4	0.690	0.680	0.665	0.664	0.687
1968	1	*****	0.660	0.660	0.660	0.683
1968	2	0.655	0.655	0.650	0.655	0.679
1968	3	0.658	0.655	0.660	0.665	0.682
1968	4	0.667	0.665	0.670	0.675	0.689
1969	1	*****	0.666	0.665	0.665	0.685
1969	2	0.662	0.665	0.665	0.686	0.686
1969	3	0.672	0.672	0.688	0.710	0.694
1969	4	0.675	0.690	0.730	0.695	0.699
1970	1	*****	0.688	0.690	0.686	0.706
1970	2	0.686	0.695	0.686	0.713	0.709
1970	3	0.700	0.695	0.714	0.714	0.710
1970	4	0.705	0.717	0.715	0.715	0.714
1971	1	*****	0.710	0.712	0.710	0.710
1971	2	0.708	0.710	0.708	0.695	0.698
1971	3	0.712	0.710	0.697	0.707	0.692
1971	4	0.712	0.700	0.710	0.705	0.697
1972	1	*****	0.705	0.705	0.705	0.700
1972	2	0.700	0.700	0.700	0.695	0.693
1972	3	0.700	0.700	0.700	0.700	0.689
1972	4	0.705	0.705	0.705	0.700	0.695
1973	1	*****	0.697	0.700	0.700	0.683
1973	2	0.694	0.693	0.695	0.640	0.630
1973	3	0.695	0.690	0.640	0.640	0.700
1973	4	0.695	0.640	0.645	0.750	0.715
1974	1	*****	0.640	0.750	0.685	0.630
1974	2	0.635	0.740	0.665	0.635	0.612
1974	3	0.750	0.680	0.650	0.630	0.603
1974	4	0.690	0.670	0.650	0.630	0.626
THEIL-U		1.160	1.100	1.090	0.667	

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table C-10--FORECAST EVALUATION OF FARM PRICE OF MILKFAT IN CREAM (DOL./LB.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	* - - - - R E V I S I O N				R A T I O - - - *			
						R1.2	R1.3	R1.4	R2.3	R3.4			
1966	1	*****	-3.63	-6.16	-2.84	*****	*****	*****	-0.70	0.54			
1966	2	-7.48	-6.07	-6.54	-4.05	0.19	0.13	0.46	-0.08	0.38			
1966	3	-15.74	-15.32	-13.65	-2.92	0.03	0.13	0.81	0.11	0.79			
1966	4	-11.93	-10.51	3.69	-0.57	0.12	1.31	0.95	1.35	1.15			
1967	1	-8.53	0.0	0.0	0.74	1.00	1.00	1.09	0.0	0.50			
1967	2	-1.48	-0.74	0.0	-3.70	0.50	1.00	-1.50	1.00	-2.50			
1967	3	-0.29	1.17	-1.03	-3.96	5.00	-2.50	-12.50	1.87	-2.86			
1967	4	0.44	-1.02	-3.20	-3.35	3.33	8.33	8.67	-2.14	-0.05			
1968	1	*****	-3.37	-3.37	-3.37	*****	*****	*****	0.0	0.0			
1968	2	-3.53	-3.53	-4.27	-3.53	0.0	-0.21	0.0	-0.21	0.17			
1968	3	-3.52	-3.96	-3.23	-2.49	-0.13	0.08	0.29	0.19	0.23			
1968	4	-3.19	-3.48	-2.76	-2.03	-0.09	0.14	0.36	0.21	0.26			
1969	1	*****	-2.77	-2.92	-2.92	*****	*****	*****	-0.05	0.0			
1969	2	-3.50	-3.06	-3.06	0.0	0.13	0.13	1.00	0.0	1.00			
1969	3	-3.17	-3.17	-0.86	2.31	0.0	0.73	1.73	0.73	3.67			
1969	4	-3.43	-1.29	4.43	-0.57	0.62	2.29	0.83	4.44	1.13			
1970	1	*****	-2.55	-2.27	-2.83	*****	*****	*****	0.11	-0.25			
1970	2	-3.24	-1.97	-3.24	0.56	0.39	0.0	1.17	-0.64	1.17			
1970	3	-1.41	-2.11	0.56	0.56	-0.50	1.40	1.40	1.27	0.0			
1970	4	-1.26	0.42	0.14	0.14	1.33	1.11	1.11	0.67	0.0			
1971	1	*****	0.0	0.28	0.0	*****	*****	*****	0.20	1.00			
1971	2	1.43	1.72	1.43	-0.43	-0.20	0.0	1.30	0.17	1.30			
1971	3	2.89	2.60	0.72	2.17	0.10	0.75	0.25	0.72	-2.00			
1971	4	2.15	0.43	1.87	1.15	0.80	0.13	0.47	-3.33	0.38			
1972	1	*****	0.71	0.71	0.71	*****	*****	*****	0.0	0.0			
1972	2	1.01	1.01	1.01	0.29	0.0	0.0	0.71	0.0	0.71			
1972	3	1.60	1.60	1.60	1.60	0.0	0.0	0.0	0.0	0.0			
1972	4	1.44	1.44	1.44	0.72	0.0	0.0	0.50	0.0	0.50			
1973	1	*****	2.05	2.49	2.49	*****	*****	*****	-0.21	0.0			
1973	2	10.16	10.00	10.32	1.59	0.02	-0.02	0.84	-0.03	0.85			
1973	3	-0.71	-1.43	-8.57	-8.57	-1.00	-11.00	-11.00	-5.00	0.0			
1973	4	-2.80	-10.49	-9.79	4.90	-2.75	-2.50	2.75	0.07	1.50			
1974	1	*****	1.59	19.05	8.73	*****	*****	*****	-11.00	0.54			
1974	2	3.76	20.92	8.66	3.76	-4.57	-1.30	0.0	0.59	0.57			
1974	3	24.38	12.77	7.79	4.48	0.48	0.68	0.82	0.39	0.43			
1974	4	10.22	7.03	3.83	0.64	0.31	0.63	0.94	0.45	0.83			

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table C-11--FORECAST EVALUATION OF FARM PRICE OF BROILERS (DOL/LB.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - - F O R E C A S T - - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	0.130	0.135	0.150	0.159
1966	2	0.125	0.140	0.140	0.150	0.157
1966	3	0.140	0.135	0.134	0.142	0.149
1966	4	0.125	0.128	0.132	0.130	0.124
1967	1	0.153	0.145	0.138	0.143	0.138
1967	2	0.146	0.140	0.140	0.140	0.130
1967	3	0.135	0.144	0.140	0.144	0.127
1967	4	0.139	0.140	0.139	0.125	0.114
1968	1	*****	0.144	0.138	0.137	0.135
1968	2	0.141	0.130	0.133	0.146	0.139
1968	3	0.135	0.134	0.141	0.145	0.142
1968	4	0.128	0.131	0.135	0.130	0.127
1969	1	*****	0.134	0.139	0.133	0.141
1969	2	0.139	0.134	0.124	0.128	0.148
1969	3	0.129	0.124	0.123	0.150	0.160
1969	4	0.109	0.111	0.135	0.135	0.139
1970	1	*****	0.140	0.140	0.145	0.145
1970	2	0.140	0.135	0.140	0.140	0.136
1970	3	0.145	0.145	0.145	0.140	0.132
1970	4	0.130	0.135	0.130	0.135	0.125
1971	1	*****	0.140	0.145	0.135	0.135
1971	2	0.142	0.140	0.135	0.140	0.144
1971	3	0.145	0.145	0.145	0.148	0.146
1971	4	0.140	0.130	0.140	0.135	0.125
1972	1	*****	0.145	0.145	0.143	0.141
1972	2	0.150	0.150	0.148	0.145	0.136
1972	3	0.145	0.145	0.150	0.148	0.152
1972	4	0.135	0.135	0.135	0.140	0.142
1973	1	*****	0.143	0.144	0.165	0.200
1973	2	0.142	0.142	0.160	0.200	0.246
1973	3	0.150	0.150	0.180	0.260	0.313
1973	4	0.140	0.160	0.240	0.250	0.208
1974	1	*****	0.210	0.240	0.240	0.224
1974	2	0.210	0.230	0.240	0.220	0.202
1974	3	0.250	0.230	0.230	0.220	0.214
1974	4	0.200	0.200	0.195	0.210	0.230

THEIL-U 0.902 0.883 0.756 0.407

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table 3-12-- FORECAST EVALUATION OF FARM PRICE OF BROILERS (DOL/LB.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	* - - - - -	R1.2	R1.3	R1.4	R2.3	R3.4	* - - - - *
1966	1	*****	-18.24	-15.09	-5.64	*****	*****	*****	*****	0.17	0.62	*****
1966	2	-20.38	-10.83	-10.83	-4.46	0.47	0.47	0.78	0.78	0.0	0.59	*****
1966	3	-6.04	-9.40	-10.07	-4.70	-0.56	-0.67	0.22	0.22	-0.07	0.53	*****
1966	4	0.81	3.23	6.45	4.84	-3.00	-7.00	-5.00	-5.00	-1.00	0.25	*****
1967	1	10.87	5.07	0.0	3.62	0.53	1.00	0.67	0.67	1.00	0.50	*****
1967	2	12.31	7.69	7.69	7.69	0.38	0.38	0.38	0.38	0.0	0.0	*****
1967	3	6.30	13.39	10.24	13.39	-1.12	-0.62	-1.12	-1.12	0.24	-0.31	*****
1967	4	21.93	22.81	21.93	9.65	-0.04	0.0	0.56	0.56	0.04	0.56	*****
1968	1	*****	6.67	2.22	1.48	*****	*****	*****	*****	0.67	0.33	*****
1968	2	1.44	-6.47	-4.32	5.04	5.50	4.00	-2.50	-2.50	0.33	2.17	*****
1968	3	-4.93	-5.63	-0.70	2.11	-0.14	0.86	1.43	1.43	0.87	4.00	*****
1968	4	0.79	3.15	6.30	2.36	-3.00	-7.00	-2.00	-2.00	-1.00	0.62	*****
1969	1	*****	-4.96	-1.42	-5.67	*****	*****	*****	*****	0.71	-3.00	*****
1969	2	-6.08	-9.46	-16.22	-13.51	-0.56	-1.67	-1.22	-1.22	-0.71	0.17	*****
1969	3	-19.38	-22.50	-23.12	-6.25	-0.16	-0.19	0.68	0.68	-0.03	0.73	*****
1969	4	-21.58	-20.14	-2.88	-2.88	0.07	0.87	0.87	0.87	0.86	0.0	*****
1970	1	*****	-3.45	-3.45	0.0	*****	*****	*****	*****	0.0	1.00	*****
1970	2	2.94	-0.74	2.94	2.94	1.25	0.0	0.0	0.0	5.00	0.0	*****
1970	3	9.85	9.85	9.85	6.06	0.0	0.0	0.38	0.38	0.0	0.38	*****
1970	4	4.00	8.00	4.00	8.00	-1.00	0.0	-1.00	-1.00	0.50	-1.00	*****
1971	1	*****	3.70	7.41	0.0	*****	*****	*****	*****	-1.00	1.00	*****
1971	2	-1.39	-2.78	-6.25	-2.78	-1.00	-3.50	-1.00	-1.00	-1.25	0.56	*****
1971	3	-0.68	-0.68	-0.68	1.37	0.0	0.0	3.00	3.00	0.0	3.00	*****
1971	4	12.00	4.00	12.00	8.00	0.67	0.0	0.33	0.33	-2.00	0.33	*****
1972	1	*****	2.84	2.84	1.42	*****	*****	*****	*****	0.0	0.50	*****
1972	2	10.29	10.29	8.82	6.62	0.0	0.14	0.36	0.36	0.14	0.25	*****
1972	3	-4.61	-4.61	-1.32	-2.63	0.0	0.71	0.43	0.43	0.71	-1.00	*****
1972	4	-4.93	-4.93	-4.93	-1.41	0.0	0.0	0.71	0.71	0.0	0.71	*****
1973	1	*****	-28.50	-28.00	-17.50	*****	*****	*****	*****	0.02	0.38	*****
1973	2	-42.28	-42.28	-34.96	-18.70	0.0	0.17	0.56	0.56	0.17	0.47	*****
1973	3	-52.08	-52.08	-42.49	-16.93	0.0	0.18	0.67	0.67	0.18	0.60	*****
1973	4	-32.69	-23.08	15.38	20.19	0.29	1.47	1.62	1.62	1.67	-0.31	*****
1974	1	*****	-6.25	7.14	7.14	*****	*****	*****	*****	2.14	0.0	*****
1974	2	3.96	13.86	18.81	8.91	-2.50	-3.75	-1.25	-1.25	-0.36	0.53	*****
1974	3	16.82	7.48	7.48	2.80	0.56	0.56	0.83	0.83	0.0	0.62	*****
1974	4	-13.04	-13.04	-15.22	-8.70	0.0	-0.17	0.33	0.33	-0.17	0.43	*****

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table C-13-- FORECAST EVALUATION OF FARM PRICE OF TURKEYS (DOL./LB.)
FORECASTS. REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - - F O R E C A S T - - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	0.210	0.210	0.230	0.241
1966	2	0.210	0.205	0.225	0.230	0.234
1966	3	0.195	0.195	0.200	0.200	0.220
1966	4	0.205	0.205	0.205	0.225	0.238
1967	1	0.242	0.210	0.210	0.220	0.214
1967	2	0.213	0.210	0.215	0.215	0.195
1967	3	0.215	0.205	0.205	0.205	0.202
1967	4	0.220	0.220	0.220	0.210	0.188
1968	1	*****	0.220	0.210	0.195	0.182
1968	2	0.225	0.200	0.200	0.175	0.189
1968	3	0.210	0.205	0.205	0.210	0.202
1968	4	0.210	0.210	0.220	0.220	0.212
1969	1	*****	0.220	0.215	0.205	0.200
1969	2	0.220	0.215	0.205	0.200	0.205
1969	3	0.213	0.213	0.205	0.220	0.213
1969	4	0.215	0.210	0.240	0.220	0.240
1970	1	*****	0.220	0.215	0.220	0.254
1970	2	0.230	0.215	0.215	0.240	0.242
1970	3	0.220	0.205	0.230	0.230	0.223
1970	4	0.220	0.220	0.220	0.225	0.223
1971	1	*****	0.215	0.220	0.220	0.216
1971	2	0.210	0.220	0.210	0.210	0.215
1971	3	0.225	0.210	0.215	0.220	0.222
1971	4	0.210	0.220	0.225	0.225	0.224
1972	1	*****	0.225	0.220	0.220	0.223
1972	2	0.225	0.215	0.220	0.225	0.216
1972	3	0.220	0.240	0.225	0.215	0.216
1972	4	0.240	0.230	0.225	0.220	0.230
1973	1	*****	0.225	0.220	0.230	0.256
1973	2	0.220	0.218	0.225	0.310	0.317
1973	3	0.218	0.220	0.310	0.330	0.393
1973	4	0.225	0.300	0.340	0.390	0.416
1974	1	*****	0.320	0.310	0.340	0.332
1974	2	0.320	0.300	0.340	0.310	0.253
1974	3	0.300	0.280	0.310	0.250	0.258
1974	4	0.290	0.320	0.270	0.280	0.307
THEIL-U						0.312
						0.548
						0.697
						0.858

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table C-14-- FORECAST EVALUATION OF FARM PRICE OF TURKEYS (DOL./LR.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	P E R C E N T E R R O R				R E V I S I O N R A T I O			
						R1.2	R1.3	R1.4	R2.3	R3.4			
1966	1	*****	-12.86	-12.86	-4.56	*****	*****	*****	0.0	0.65			
1966	2	-10.26	-12.39	-3.85	-1.71	-0.21	0.63	0.83	0.69	0.56			
1966	3	-11.36	-11.36	-9.09	-9.09	0.0	0.20	0.20	0.20	0.0			
1966	4	-13.87	-13.87	-13.87	-5.46	0.0	0.0	0.61	0.0	0.61			
1967	1	13.08	-1.87	-1.87	2.80	1.14	1.14	0.79	0.0	2.50			
1967	2	9.23	7.69	10.26	10.26	0.17	-0.11	-0.11	-0.33	0.0			
1967	3	6.44	1.49	1.49	1.49	0.77	0.77	0.77	0.0	0.0			
1967	4	17.02	17.02	17.02	11.70	0.0	0.0	0.31	0.0	0.31			
1968	1	*****	20.88	15.38	7.14	*****	*****	*****	0.26	0.54			
1968	2	19.05	5.82	5.82	-7.41	0.69	0.69	1.39	0.0	2.27			
1968	3	3.96	1.49	1.49	3.96	0.63	0.63	0.0	0.0	-1.67			
1968	4	-0.94	-0.94	3.77	3.77	0.0	5.00	5.00	5.00	0.0			
1969	1	*****	10.00	7.50	2.50	*****	*****	*****	0.25	0.67			
1969	2	7.32	4.88	0.0	-2.44	0.33	1.00	1.33	1.00	-0.50			
1969	3	0.0	0.0	-3.76	3.29	0.0	-0.80	0.70	-0.80	1.88			
1969	4	-10.42	-12.50	0.0	-8.33	-0.20	1.00	0.20	1.00	-2.00			
1970	1	*****	-13.39	-15.35	-13.39	*****	*****	*****	-0.15	0.13			
1970	2	-4.96	-11.16	-11.16	-0.83	-1.25	-1.25	0.83	0.0	0.93			
1970	3	-1.35	-8.07	3.14	3.14	-5.00	3.33	3.33	1.39	0.0			
1970	4	-1.35	-1.35	-1.35	0.90	0.0	0.0	1.67	0.0	1.67			
1971	1	*****	-0.46	1.85	1.85	*****	*****	*****	5.00	0.0			
1971	2	-2.33	2.33	-2.33	-2.33	2.00	0.0	0.0	2.00	0.0			
1971	3	1.35	-5.41	-3.15	-0.90	5.00	3.33	1.67	0.42	0.71			
1971	4	-6.25	-1.79	0.45	0.45	0.71	1.07	1.07	1.25	0.0			
1972	1	*****	0.90	-1.35	-1.35	*****	*****	*****	2.50	0.0			
1972	2	4.17	-0.46	1.85	4.17	1.11	0.56	0.0	5.00	-1.25			
1972	3	1.85	11.11	4.17	-0.46	-5.00	-1.25	1.25	0.62	1.11			
1972	4	4.35	0.0	-2.17	-4.35	1.00	1.50	2.00	-0.50	-1.00			
1973	1	*****	-12.11	-14.06	-10.16	*****	*****	*****	-0.16	0.28			
1973	2	-30.60	-31.23	-29.02	-2.21	-0.02	0.05	0.93	0.07	0.92			
1973	3	-44.53	-44.02	-21.12	-16.03	0.01	0.53	0.64	0.52	0.24			
1973	4	-45.91	-27.88	-18.27	-6.25	0.39	0.60	0.86	0.34	0.66			
1974	1	*****	-3.61	-6.63	2.41	*****	*****	*****	-0.83	1.36			
1974	2	26.48	18.58	34.39	22.53	0.30	-0.30	0.15	-0.85	0.34			
1974	3	16.28	8.53	20.16	-3.10	0.48	-0.24	1.19	-1.36	1.15			
1974	4	-5.54	4.23	-12.05	-8.79	1.76	-1.18	-0.59	3.85	0.27			

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table C-15-- FORECAST EVALUATION OF FARM PRICE OF EGGS (DOL./DOZ.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	0.360	0.360	0.370	0.405
1966	2	0.310	0.300	0.310	0.320	0.350
1966	3	0.330	0.330	0.330	0.340	0.393
1966	4	0.330	0.330	0.330	0.360	0.414
1967	1	0.362	0.320	0.330	0.350	0.351
1967	2	0.349	0.290	0.280	0.270	0.287
1967	3	0.320	0.310	0.310	0.320	0.306
1967	4	0.340	0.340	0.350	0.310	0.303
1968	1	*****	0.370	0.330	0.320	0.309
1968	2	0.320	0.300	0.300	0.290	0.289
1968	3	0.330	0.315	0.320	0.340	0.367
1968	4	0.330	0.330	0.380	0.380	0.397
1969	1	*****	0.390	0.390	0.390	0.408
1969	2	0.360	0.335	0.335	0.345	0.328
1969	3	0.370	0.370	0.370	0.370	0.382
1969	4	0.340	0.340	0.350	0.390	0.481
1970	1	*****	0.360	0.370	0.440	0.476
1970	2	0.300	0.320	0.350	0.330	0.318
1970	3	0.350	0.360	0.330	0.340	0.360
1970	4	0.370	0.350	0.350	0.350	0.353
1971	1	*****	0.330	0.360	0.350	0.333
1971	2	0.300	0.290	0.290	0.290	0.298
1971	3	0.340	0.340	0.350	0.350	0.302
1971	4	0.360	0.360	0.360	0.350	0.310
1972	1	*****	0.365	0.350	0.330	0.304
1972	2	0.320	0.315	0.310	0.290	0.276
1972	3	0.380	0.340	0.340	0.340	0.315
1972	4	0.380	0.380	0.370	0.350	0.370
1973	1	*****	0.375	0.380	0.450	0.464
1973	2	0.320	0.320	0.370	0.380	0.475
1973	3	0.350	0.400	0.420	0.520	0.615
1973	4	0.420	0.450	0.540	0.580	0.608
1974	1	*****	0.500	0.540	0.580	0.624
1974	2	0.420	0.450	0.450	0.470	0.439
1974	3	0.480	0.470	0.500	0.450	0.482
1974	4	0.470	0.520	0.510	0.570	0.567
THEIL-U						0.335

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table C-16-- FORECAST EVALUATION OF FARM PRICE OF EGGS (DOL./DOZ.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	* - - - - - P E R C E N T E R R O R - - - *	* - - - - R E V I S I O N R A T I O - - - *	R1.2	R1.3	R1.4	R2.3	R3.4
1966	1	*****	-11.11	-11.11	-8.64	*****	*****	*****	*****	*****	0.0	0.22
1966	2	-11.43	-14.29	-11.43	-8.57	*****	*****	-0.25	0.0	0.25	0.20	0.25
1966	3	-16.03	-16.03	-16.03	-13.49	*****	*****	0.0	0.0	0.16	0.0	0.16
1966	4	-20.29	-20.29	-20.29	-13.04	*****	*****	0.0	0.0	0.36	0.0	0.36
1967	1	3.13	-8.83	-5.98	-0.28	*****	*****	3.82	2.91	1.09	0.32	0.95
1967	2	21.60	1.05	-2.44	-5.92	*****	*****	0.95	1.11	1.27	3.33	-1.43
1967	3	4.58	1.31	1.31	4.58	*****	*****	0.71	0.71	0.0	0.0	-2.50
1967	4	12.21	12.21	15.51	2.31	*****	*****	0.0	-0.27	0.81	-0.27	0.85
1968	1	*****	19.74	6.80	3.56	*****	*****	*****	*****	*****	0.66	0.48
1968	2	10.73	3.81	3.81	0.35	*****	*****	0.65	0.65	0.97	0.0	0.91
1968	3	-10.08	-14.17	-12.81	-7.36	*****	*****	-0.41	-0.27	0.27	0.10	0.43
1968	4	-16.88	-16.88	-4.28	-4.28	*****	*****	0.0	0.75	0.75	0.75	0.0
1969	1	*****	-4.41	-4.41	-4.41	*****	*****	*****	*****	*****	0.0	0.0
1969	2	9.76	2.13	2.13	5.18	*****	*****	0.78	0.78	0.47	0.0	-1.43
1969	3	-3.14	-3.14	-3.14	-3.14	*****	*****	0.0	0.0	0.0	0.0	0.0
1969	4	-29.31	-29.31	-27.23	-18.92	*****	*****	0.0	0.07	0.35	0.07	0.31
1970	1	*****	-24.37	-22.27	-7.56	*****	*****	*****	*****	*****	0.09	0.66
1970	2	-5.66	0.63	10.06	3.77	*****	*****	1.11	2.78	1.67	-15.00	0.63
1970	3	-2.78	0.0	-8.33	-5.56	*****	*****	1.00	-2.00	-1.00	-3.00	0.33
1970	4	4.82	-0.85	-0.85	-0.85	*****	*****	1.18	1.18	1.18	0.0	0.0
1971	1	*****	-0.90	8.11	5.11	*****	*****	*****	*****	*****	10.00	0.37
1971	2	0.67	-2.68	-2.68	-2.68	*****	*****	5.00	5.00	5.00	0.0	0.0
1971	3	12.58	12.58	15.89	15.89	*****	*****	0.0	-0.26	-0.26	-0.26	0.0
1971	4	16.13	16.13	16.13	12.90	*****	*****	0.0	0.0	0.20	0.0	0.20
1972	1	*****	20.07	15.13	8.55	*****	*****	*****	*****	*****	0.25	0.43
1972	2	15.94	14.13	12.32	5.07	*****	*****	0.11	0.23	0.68	0.13	0.59
1972	3	20.63	7.94	7.94	7.94	*****	*****	0.62	0.62	0.62	0.0	0.0
1972	4	2.70	2.70	0.0	-5.41	*****	*****	0.0	1.00	3.00	1.00	-2.00
1973	1	*****	-19.18	-18.10	-3.02	*****	*****	*****	*****	*****	0.06	0.83
1973	2	-32.63	-32.63	-22.11	-20.00	*****	*****	0.0	0.32	0.39	0.32	0.10
1973	3	-43.09	-34.96	-31.71	-15.45	*****	*****	0.19	0.26	0.64	0.09	0.51
1973	4	-30.92	-25.99	-11.18	-4.61	*****	*****	0.16	0.64	0.85	0.57	0.59
1974	1	*****	-19.87	-13.46	-7.05	*****	*****	*****	*****	*****	0.32	0.48
1974	2	-4.31	2.51	2.51	7.06	*****	*****	1.58	1.58	2.63	0.0	-1.82
1974	3	-0.41	-2.49	3.73	-6.64	*****	*****	-5.00	10.00	-15.00	2.50	2.78
1974	4	-17.11	-8.29	-10.05	0.53	*****	*****	0.52	0.41	1.03	-0.21	1.05

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table C-17-- FORECAST EVALUATION OF FARM PRICE OF WOOL (DOL./LR.)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1966-1974

* - - - - - F O R E C A S T - - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1966	1	*****	0.485	0.486	0.495	0.503
1966	2	0.490	0.500	0.500	0.525	0.538
1966	3	0.482	0.495	0.490	0.500	0.492
1966	4	0.490	0.490	0.510	0.515	0.428
1967	1	0.520	0.500	0.500	0.460	0.405
1967	2	0.540	0.535	0.510	0.480	0.405
1967	3	0.515	0.490	0.445	0.440	0.400
1967	4	0.460	0.445	0.430	0.412	0.376
1968	1	*****	0.450	0.420	0.400	0.364
1968	2	0.460	0.430	0.410	0.400	0.417
1968	3	0.410	0.400	0.390	0.400	0.400
1968	4	0.400	0.390	0.390	0.410	0.383
1969	1	*****	0.400	0.430	0.420	0.387
1969	2	0.430	0.440	0.430	0.430	0.430
1969	3	0.420	0.420	0.415	0.400	0.402
1969	4	0.410	0.400	0.390	0.390	0.389
1970	1	*****	0.400	0.390	0.390	0.359
1970	2	0.420	0.410	0.410	0.400	0.372
1970	3	0.400	0.400	0.380	0.370	0.343
1970	4	0.390	0.370	0.360	0.355	0.308
1971	1	*****	0.380	0.350	0.340	0.244
1971	2	0.400	0.370	0.360	0.310	0.218
1971	3	0.390	0.380	0.320	0.230	0.185
1971	4	0.380	0.310	0.220	0.225	0.172
1972	1	*****	0.250	0.260	0.240	0.205
1972	2	0.290	0.300	0.270	0.300	0.343
1972	3	0.300	0.280	0.330	0.420	0.378
1972	4	0.280	0.340	0.420	0.460	0.509
1973	1	*****	0.430	0.480	0.520	0.754
1973	2	0.450	0.500	0.560	0.950	0.845
1973	3	0.510	0.560	0.900	0.850	0.818
1973	4	0.560	0.800	0.800	0.800	0.716
1974	1	*****	0.750	0.780	0.800	0.715
1974	2	0.700	0.760	0.750	0.750	0.669
1974	3	0.740	0.750	0.760	0.650	0.541
1974	4	0.700	0.760	0.630	0.590	0.463
THEIL-U						0.361
						0.709
						0.536

NOTE: ASTERISKS SIGNIFY INCOMPLETE DATA.

Table C-18-- FORECAST EVALUATION OF FARM PRICE OF WOOL (DOL./LB.)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1966-1974

YEAR	QUARTER	P E R C E N T E R R O R				R E V I S I O N R A T I O				
		1ST	2ND	3RD	4TH	R1.2	R1.3	R1.4	R2.3	R3.4
1966	1	*****	-3.58	-3.38	-1.59	*****	*****	*****	0.06	0.53
1966	2	-8.92	-7.06	-7.06	-2.42	0.21	0.21	0.73	0.0	0.66
1966	3	-2.03	0.61	-0.41	1.63	1.30	0.80	1.80	1.67	5.00
1966	4	14.49	14.49	19.16	20.33	0.0	-0.32	-0.40	-0.32	-0.06
1967	1	28.40	23.46	23.46	13.58	0.17	0.17	0.52	0.0	0.42
1967	2	33.33	32.10	25.93	18.52	0.04	0.22	0.44	0.19	0.29
1967	3	28.75	22.50	11.25	10.00	0.22	0.61	0.65	0.50	0.11
1967	4	22.34	18.35	14.36	9.57	0.18	0.36	0.57	0.22	0.33
1968	1	*****	23.63	15.38	9.89	*****	*****	*****	0.35	0.36
1968	2	10.31	3.12	-1.68	-4.08	0.70	1.16	1.40	1.54	-1.43
1968	3	2.50	0.0	-2.50	0.0	1.00	2.00	1.00	-1.00	1.00
1968	4	4.44	1.83	1.83	7.05	0.59	0.59	-0.59	0.0	-2.86
1969	1	*****	3.36	11.11	8.53	*****	*****	*****	-2.31	0.23
1969	2	0.0	2.33	0.0	0.0	1.00	0.0	0.0	1.00	0.0
1969	3	4.48	4.48	3.23	-0.50	0.0	0.28	1.11	0.28	1.15
1969	4	5.40	2.83	0.26	0.26	0.48	0.95	0.95	0.91	0.0
1970	1	*****	11.42	8.64	8.64	*****	*****	*****	0.24	0.0
1970	2	12.90	10.22	10.22	7.53	0.21	0.21	0.42	0.0	0.26
1970	3	16.62	16.62	10.79	7.87	0.0	0.35	0.53	0.35	0.27
1970	4	26.62	20.13	16.88	15.26	0.24	0.37	0.43	0.16	0.10
1971	1	*****	55.74	43.44	39.34	*****	*****	*****	0.22	0.09
1971	2	83.49	69.72	65.14	42.20	0.16	0.22	0.49	0.07	0.35
1971	3	110.81	105.41	72.97	24.32	0.05	0.34	0.78	0.31	0.67
1971	4	120.93	80.23	27.91	30.81	0.34	0.77	0.75	0.65	-0.10
1972	1	*****	21.95	26.83	17.07	*****	*****	*****	-0.22	0.36
1972	2	-15.45	-12.54	-21.28	-12.54	0.19	-0.38	0.19	-0.70	0.41
1972	3	-20.63	-25.93	-12.70	11.11	-0.26	0.38	1.54	0.51	1.87
1972	4	-44.99	-33.20	-17.49	-9.63	0.26	0.61	0.79	0.47	0.45
1973	1	*****	-42.97	-36.34	-31.03	*****	*****	*****	0.15	0.15
1973	2	-46.75	-40.83	-33.73	12.43	0.13	0.28	1.27	0.17	1.37
1973	3	-37.65	-31.54	10.02	3.91	0.16	1.27	1.10	1.32	0.61
1973	4	-21.79	11.73	11.73	11.73	1.54	1.54	1.54	0.0	0.0
1974	1	*****	4.90	9.09	11.89	*****	*****	*****	-0.86	-0.31
1974	2	4.63	13.60	12.11	12.11	-1.94	-1.61	-1.61	0.11	0.0
1974	3	36.78	38.63	40.48	20.15	-0.05	-0.10	0.45	-0.05	0.50
1974	4	51.19	64.15	36.07	27.43	-0.25	0.30	0.46	0.44	0.24

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table C-19--FORECAST EVALUATION: DISTRIBUTION OF REVISION RATIOS,
FARM PRICES FOR LIVESTOCK AND PRODUCTS

PERCENTAGE OF R STATISTICS						
	.01-	.01-	1.00-	OVER	UNDER	TOTAL
	1.99	.99	1.99	1.99	0.00	0.00
R1.2						
FARM PRICE OF BEEF CATTLE (DOL./CWT.)	46.43	39.29	7.14	3.57	25.00	25.00
FARM PRICE OF LAMBS (DOL./CWT.)	35.71	32.14	3.57	7.14	28.57	28.57
FARM PRICE OF HOGS (DOL./CWT.)	64.29	50.00	14.29	10.71	14.29	10.71
FARM PRICE OF WHOLESALE MILK (DOL./CWT.)	50.00	39.29	10.71	3.57	14.29	32.14
FARM PRICE OF MILKFAT IN CREAM (DOL./LB.)	50.00	42.86	7.14	7.14	25.00	17.86
FARM PRICE OF BROILERS (DOL./LB.)	28.57	25.00	3.57	3.57	39.29	28.57
FARM PRICE OF TURKEYS (DOL./LB.)	50.00	35.71	14.29	7.14	21.43	21.43
FARM PRICE OF EGGS (DOL./DOZ.)	46.43	32.14	14.29	7.14	10.71	35.71
FARM PRICE OF WOOL (DOL./LB.)	75.00	60.71	14.29	0.0	14.29	10.71
* * * FORECAST TOTAL * * *	49.60	39.68	9.92	5.56	21.43	23.41
R1.3						
FARM PRICE OF BEEF CATTLE (DOL./CWT.)	57.14	42.86	14.29	10.71	25.00	7.14
FARM PRICE OF LAMBS (DOL./CWT.)	53.57	42.86	10.71	10.71	28.57	7.14
FARM PRICE OF HOGS (DOL./CWT.)	71.43	50.00	21.43	10.71	10.71	7.14
FARM PRICE OF WHOLESALE MILK (DOL./CWT.)	67.86	35.71	32.14	3.57	14.29	14.29
FARM PRICE OF MILKFAT IN CREAM (DOL./LB.)	53.57	35.71	17.86	7.14	21.43	17.86
FARM PRICE OF BROILERS (DOL./LB.)	39.29	32.14	7.14	3.57	32.14	25.00
FARM PRICE OF TURKEYS (DOL./LB.)	50.00	32.14	17.86	10.71	25.00	14.29
FARM PRICE OF EGGS (DOL./DOZ.)	53.57	39.29	14.29	14.29	14.29	17.86
FARM PRICE OF WOOL (DOL./LB.)	78.57	67.86	10.71	3.57	14.29	3.57
* * * FORECAST TOTAL * * *	58.33	42.06	16.27	8.33	20.63	12.70
R1.4						
FARM PRICE OF BEEF CATTLE (DOL./CWT.)	75.00	60.71	14.29	10.71	10.71	3.57
FARM PRICE OF LAMBS (DOL./CWT.)	71.43	53.57	17.86	7.14	14.29	7.14
FARM PRICE OF HOGS (DOL./CWT.)	85.71	71.43	14.29	7.14	7.14	0.0
FARM PRICE OF WHOLESALE MILK (DOL./CWT.)	89.29	46.43	42.86	3.57	0.0	7.14
FARM PRICE OF MILKFAT IN CREAM (DOL./LB.)	71.43	46.43	25.00	7.14	10.71	10.71
FARM PRICE OF BROILERS (DOL./LB.)	64.29	57.14	7.14	3.57	28.57	3.57
FARM PRICE OF TURKEYS (DOL./LB.)	71.43	46.43	25.00	10.71	7.14	10.71
FARM PRICE OF EGGS (DOL./DOZ.)	71.43	53.57	17.86	10.71	10.71	7.14
FARM PRICE OF WOOL (DOL./LB.)	85.71	57.14	28.57	0.0	10.71	3.57
* * * FORECAST TOTAL * * *	76.19	54.76	21.43	6.75	11.11	5.95
R2.3						
FARM PRICE OF BEEF CATTLE (DOL./CWT.)	58.33	55.56	2.78	8.33	16.67	16.67
FARM PRICE OF LAMBS (DOL./CWT.)	50.00	36.11	13.89	5.56	22.22	22.22
FARM PRICE OF HOGS (DOL./CWT.)	61.11	52.78	8.33	8.33	27.78	2.78
FARM PRICE OF WHOLESALE MILK (DOL./CWT.)	55.56	41.67	13.89	2.78	11.11	30.56
FARM PRICE OF MILKFAT IN CREAM (DOL./LB.)	47.22	36.11	11.11	2.78	30.56	19.44
FARM PRICE OF BROILERS (DOL./LB.)	44.44	38.89	5.56	5.56	27.78	22.22
FARM PRICE OF TURKEYS (DOL./LB.)	36.11	25.00	11.11	16.67	22.22	25.00
FARM PRICE OF EGGS (DOL./DOZ.)	41.67	38.89	2.78	8.33	13.89	36.11
FARM PRICE OF WOOL (DOL./LB.)	66.67	55.56	11.11	0.0	19.44	13.89
* * * FORECAST TOTAL * * *	51.23	42.28	8.95	6.48	21.30	20.99
R3.4						
FARM PRICE OF BEEF CATTLE (DOL./CWT.)	75.00	58.33	16.67	2.78	8.33	13.89
FARM PRICE OF LAMBS (DOL./CWT.)	69.44	50.00	19.44	0.0	16.67	13.89
FARM PRICE OF HOGS (DOL./CWT.)	66.67	61.11	5.56	13.89	13.89	5.56
FARM PRICE OF WHOLESALE MILK (DOL./CWT.)	66.67	47.22	19.44	8.33	8.33	16.67
FARM PRICE OF MILKFAT IN CREAM (DOL./LB.)	61.11	41.67	19.44	2.78	13.89	22.22
FARM PRICE OF BROILERS (DOL./LB.)	66.67	61.11	5.56	8.33	13.89	11.11
FARM PRICE OF TURKEYS (DOL./LB.)	55.56	41.67	13.89	5.56	13.89	25.00
FARM PRICE OF EGGS (DOL./DOZ.)	63.89	61.11	2.78	2.78	13.89	19.44
FARM PRICE OF WOOL (DOL./LB.)	69.44	58.33	11.11	2.78	13.89	13.89
* * * FORECAST TOTAL * * *	66.05	53.40	12.65	5.25	12.96	15.74

Table C-20-- FORECAST EVALUATION: SUMMARY OF PERCENT ERROR AND THEIL-U STATISTIC FOR FARM PRICES OF LIVESTOCK AND PRODUCTS

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Table D-1--FORECAST EVALUATION OF CONSUMER PRICE INDEX--ALL FOOD ITEMS (1967=100)
FORECASTS, REPORTED VALUES AND THE 1-4 STATISTIC BY FORECAST PERIOD, 1971-1974

YEAR	PERIOD	1ST	2ND	3RD	4TH	REPORTED
1971	1	*****	*****	116.400	116.000	116.100
1971	2	*****	117.500	117.400	117.000	117.400
1971	3	118.400	118.700	119.300	120.700	119.600
1971	4	118.400	120.000	120.900	119.600	119.400
1972	1	*****	122.000	121.000	121.200	121.600
1972	2	122.300	122.200	122.800	123.400	122.600
1972	3	*****	123.600	124.400	125.000	124.500
1972	4	122.800	124.200	124.900	124.900	125.400
1973	1	*****	127.100	125.000	129.300	131.400
1973	2	128.400	126.900	129.900	132.500	138.100
1973	3	128.100	130.300	132.700	144.300	146.200
1973	4	130.600	131.500	149.800	146.600	149.900
1974	1	*****	149.400	147.800	156.600	156.800
1974	2	151.000	148.500	159.800	159.200	159.500
1974	3	*****	160.700	160.300	164.000	162.800
1974	4	159.000	159.300	166.000	167.000	167.900
THEIR-II						0.129
						0.555
						0.340

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table D-2--FORECAST EVALUATION OF CONSUMER PRICE INDEX--ALL FOOD ITEMS(1967=100)
 DEFECT TREND AND REVISION RATIO BY FORECAST PERIOD, 1971-1974

YEAR	QUARTER	DEFECT TREND				REVISION				RATIO		
		1ST	2ND	3RD	4TH	Q1.2	Q1.3	Q1.4	Q2.3	Q3.4		
1971	1	*****	*****	0.43	-0.00	*****	*****	*****	*****	1.20		
1971	2	*****	-0.48	-0.24	-0.42	*****	*****	*****	*****	0.50		
1971	3	-0.84	-0.75	-0.25	0.92	0.10	0.70	2.10	0.67	4.67		
1971	4	-0.84	0.50	1.24	0.17	1.60	2.50	1.20	-1.50	0.87		
1972	1	*****	0.33	-0.40	-0.33	*****	*****	*****	2.50	0.33		
1972	2	0.57	-0.33	0.16	0.55	1.57	0.71	-0.14	1.50	-3.00		
1972	3	*****	-0.72	0.08	0.40	*****	*****	*****	1.11	-4.00		
1972	4	-1.24	-0.06	-1.10	-0.10	0.25	0.69	0.69	0.58	0.0		
1973	1	*****	-3.27	-4.10	-1.60	*****	*****	*****	-0.28	0.62		
1973	2	-7.02	-8.11	-5.94	-4.04	-0.15	0.15	0.42	0.27	0.32		
1973	3	-12.38	-10.88	-9.23	-1.30	0.12	0.25	0.90	0.15	0.86		
1973	4	-12.88	-12.27	-0.07	-2.20	0.05	0.99	0.83	0.99	-32.00		
1974	1	*****	-4.72	-5.74	-0.13	*****	*****	*****	-0.22	0.98		
1974	2	-5.33	-4.00	0.10	-0.10	-0.29	1.04	0.96	1.03	2.00		
1974	3	*****	-1.20	-1.54	0.74	*****	*****	*****	-0.19	1.48		
1974	4	-5.30	-5.12	-1.13	0.0	0.03	0.79	1.00	0.78	1.00		

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table D-3-- FORECAST EVALUATION: DISTRIBUTION OF REVISION RATIOS, CONSUMER PRICE INDEX FOR ALL FOOD ITEMS

FORECAST REVISION AND VARIABLE	PERCENTAGE OF R STATISTICS									
	.01- 1.99	.01- .99	1.00- 1.99	OVER 1.99	UNDER 0.00	TOTAL				
R1.2 FOOD SUMMER PRICE INDEX-ALL FOOD ITEMS(1967=100)	77.78	55.56	22.22	0.0	22.22	0.0	100.00			
R1.3 CONSUMER PRICE INDEX-ALL FOOD ITEMS(1967=100)	88.89	77.78	11.11	11.11	0.0	0.0	100.00			
R1.4 CONSUMER PRICE INDEX-ALL FOOD ITEMS(1967=100)	77.78	55.56	22.22	11.11	11.11	0.0	100.00			
R2.3 CONSUMER PRICE INDEX-ALL FOOD ITEMS(1967=100)	60.00	40.00	20.00	6.67	33.33	0.0	100.00			
R3.4 CONSUMER PRICE INDEX-ALL FOOD ITEMS(1967=100)	62.50	43.75	18.75	12.50	18.75	6.25	100.00			

Table D-4-- FORECAST EVALUATION: SUMMARY OF PERCENT ERROR AND THEIL-U STATISTIC FOR THE PERIOD
CONSUMER PRICE INDEX FOR ALL FOOD ITEMS

	AVERAGE	PERCENT ERROR RANGE LOW HIGH	UNDER-EST. %	OVER-EST. %	THEIL-U
CONSUMER PRICE INDEX-ALL FOOD ITEMS(1947=100)	5.16	0.57 12.88	88.89	11.11	0.665
FORECAST PERIOD 1					
CONSUMER PRICE INDEX-ALL FOOD ITEMS(1947=100)	3.79	0.33 12.27	86.67	13.33	0.555
FORECAST PERIOD 2					
CONSUMER PRICE INDEX-ALL FOOD ITEMS(1947=100)	2.00	0.07 9.23	68.75	31.25	0.340
FORECAST PERIOD 3					
CONSUMER PRICE INDEX-ALL FOOD ITEMS(1947=100)	0.85	0.00 4.06	62.50	31.25	0.129
FORECAST PERIOD 4					

Table E-1-- FORECAST EVALUATION OF VOLUME OF ALL FARM MARKETINGS (1967=100)
 FORECASTS, REPORTED VALUES AND THIRL-U STATISTIC BY FORECAST PERIOD, 1971-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1971	1	*****	*****	*****	96.000	92.000
1971	2	*****	*****	*****	86.000	83.000
1971	3	*****	105.000	105.000	110.000	113.000
1971	4	130.000	126.000	141.000	140.000	151.000
1972	1	*****	*****	*****	92.500	98.000
1972	2	*****	*****	83.500	86.000	85.000
1972	3	*****	111.500	113.000	112.000	110.000
1972	4	147.500	149.000	150.000	151.000	150.000
1973	1	*****	96.000	98.000	104.000	110.000
1973	2	84.000	85.000	88.000	86.000	87.000
1973	3	*****	117.000	114.000	112.000	109.000
1973	4	155.000	159.000	165.000	161.000	157.000
1974	1	*****	107.000	101.000	103.000	103.000
1974	2	86.000	80.000	85.000	82.000	93.000
1974	3	*****	115.000	112.000	116.000	112.000
1974	4	157.000	156.000	151.000	150.000	137.000
THIRL-U		0.978	1.035	0.849	0.738	

NOTE--STATISTICS SIGNIFY INCOMPLETE DATA.

Table E-2-- FORECAST EVALUATION OF VOLUME OF ALL FARM MARKETING (1967=100)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1971-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	1.2	1.3	1.4	2.3	3.4
1971	1	*****	*****	*****	4.35	*****	*****	*****	*****	*****
1971	2	*****	*****	3.61	3.61	*****	*****	*****	*****	0.0
1971	3	*****	*****	-7.72	-2.65	*****	*****	*****	0.0	0.63
1971	4	-13.91	-11.26	-5.62	-7.28	0.19	0.52	0.48	0.41	-0.10
1972	1	*****	*****	*****	-5.61	*****	*****	*****	*****	*****
1972	2	*****	*****	-1.74	1.18	*****	*****	*****	*****	1.67
1972	3	*****	*****	2.73	1.82	*****	*****	*****	-1.00	0.33
1972	4	-1.67	-0.67	0.0	0.57	0.60	1.00	1.40	1.00	100.00
1973	1	*****	-12.73	-10.41	-5.45	*****	*****	*****	0.14	0.50
1973	2	-3.45	-2.20	1.15	-1.15	0.33	1.33	0.67	1.50	2.00
1973	3	*****	7.24	4.59	2.75	*****	*****	*****	0.38	0.40
1973	4	-1.27	1.27	5.15	2.55	2.00	5.00	3.00	-3.00	0.50
1974	1	*****	3.88	-1.96	0.0	*****	*****	*****	1.50	1.00
1974	2	-7.53	-13.08	-8.60	-11.83	-0.86	-0.14	-0.57	0.38	-0.38
1974	3	*****	2.68	0.0	3.57	*****	*****	*****	1.00	400.00
1974	4	14.60	13.87	10.22	6.49	0.05	0.30	0.35	0.26	0.07

NOTE--STATISTICS STANIFY INCOMPLETE DATA.

Table E-3-- FORECAST EVALUATION OF VOLUME OF FARM MARKETINGS - LIVESTOCK AND LIVESTOCK PRODUCTS (1967=100)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1971-1974

YEAR	COUNTY	1ST	2ND	3RD	4TH	REPORTED
1971	1	*****	*****	*****	101.000	102.000
1971	2	*****	*****	*****	106.000	107.000
1971	3	*****	103.000	104.000	108.000	109.000
1971	4	110.000	110.000	111.000	111.000	114.000
1972	1	*****	*****	*****	102.500	102.000
1972	2	*****	*****	107.500	108.000	107.000
1972	3	*****	108.500	109.000	112.000	107.000
1972	4	107.500	109.000	110.000	118.000	112.000
1973	1	*****	103.000	104.000	103.000	104.000
1973	2	105.000	105.000	105.000	108.000	104.000
1973	3	*****	110.000	110.000	106.000	100.000
1973	4	117.000	115.000	112.000	108.000	113.000
1974	1	*****	106.000	107.000	101.000	100.000
1974	2	107.000	105.000	105.000	106.000	104.000
1974	3	*****	104.000	103.000	105.000	102.000
1974	4	112.000	114.000	115.000	117.000	109.000
THEIL-U=		1.357	1.333	1.312	1.428	

NOTE--ASTERISCS SIGNIFY INCOMPLETE DATA.

Table E-4-- FORECAST EVALUATION OF VOLUME OF FARM MARKETINGS - LIVESTOCK AND LIVESTOCK PRODUCTS (1967=100)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1971-1974

Year	1st	2nd	3rd	4th	1.2	1.3	1.4	2.3	3.4
1971	*****	*****	*****	-0.98	*****	*****	*****	*****	*****
1971	*****	*****	-1.27	-0.93	*****	*****	*****	*****	0.50
1971	*****	-5.50	-4.53	-0.92	*****	*****	*****	0.17	0.80
1971	-3.51	-3.51	-2.43	-2.63	0.0	0.25	0.25	0.25	0.0
1972	*****	*****	*****	0.40	*****	*****	*****	*****	*****
1972	*****	*****	0.47	0.93	*****	*****	*****	*****	-1.00
1972	*****	1.40	1.87	4.57	*****	*****	*****	-0.33	-1.50
1972	-4.02	-3.57	3.57	5.36	0.11	1.89	2.33	2.00	-0.50
1973	*****	-0.54	0.0	-0.36	*****	*****	*****	1.00	-100.00
1973	0.46	0.06	3.85	3.85	0.0	-3.00	-3.00	-3.00	0.0
1973	*****	10.00	10.00	5.00	*****	*****	*****	0.0	0.40
1973	3.54	1.77	-0.82	-4.42	0.50	1.25	2.25	1.50	-4.00
1974	*****	4.00	-3.00	1.00	*****	*****	*****	1.50	1.33
1974	2.00	0.06	0.94	1.92	0.67	0.67	0.33	0.0	-1.00
1974	*****	1.06	0.92	2.94	*****	*****	*****	0.50	-2.00
1974	2.75	4.50	5.50	7.34	-0.67	-1.00	-1.67	-0.20	-0.33

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table E-5-- FORECAST EVALUATION OF VOLUME OF FARM MARKETINGS -CROPS (1967=100)
 FORECASTS, REPORTED VALUES AND THRU-STATISTIC BY FORECAST PERIOD, 1971-1974

* - - - - - F O R E C A S T - - - - - *					
YEAR	QUARTER	1ST	2ND	3RD	4TH
					REPORTED
1971	1	*****	*****	*****	85.000
1971	2	*****	*****	*****	53.000
1971	3	*****	106.000	106.000	112.000
1971	4	170.000	170.000	178.000	201.000
1972	1	*****	*****	*****	81.500
1972	2	*****	*****	52.500	57.000
1972	3	*****	114.500	116.000	113.000
1972	4	200.500	206.000	199.000	201.000
1973	1	*****	87.000	88.000	105.000
1973	2	54.000	54.000	62.000	56.000
1973	3	*****	129.000	120.000	123.000
1973	4	212.000	220.000	227.000	215.000
1974	1	*****	110.000	106.000	107.000
1974	2	56.000	51.000	62.000	56.000
1974	3	*****	133.000	125.000	121.000
1974	4	216.000	211.000	194.000	191.000
THRU-STAT		1.060	1.051	0.754	0.632

STATISTICS SIGNIFY INCOMPLETE DATA.

Table E-6-- FORECAST EVALUATION OF VOLUME OF FARM MARKETINGS -CROPS (1967=100)
PERCENT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1971-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	R1.2	R1.3	R1.4	R2.3	R3.4
1971	1	*****	*****	*****	4.94	*****	*****	*****	*****	*****
1971	2	*****	*****	5.77	1.02	*****	*****	*****	*****	0.67
1971	3	*****	-10.17	-10.17	-5.02	*****	*****	*****	0.0	0.50
1971	4	-15.42	-15.42	-11.44	-11.44	0.0	0.26	0.26	0.26	0.0
1972	1	*****	*****	*****	-11.41	*****	*****	*****	*****	*****
1972	2	*****	*****	-7.89	-12.22	*****	*****	*****	*****	-0.56
1972	3	*****	0.44	1.75	-0.22	*****	*****	*****	-3.00	1.50
1972	4	-0.25	2.49	-1.00	-3.42	11.00	-3.00	-13.00	1.40	-2.50
1973	1	*****	-26.27	-25.42	-11.02	*****	*****	*****	0.03	0.57
1973	2	-16.92	-16.02	-4.62	-13.25	0.0	0.73	0.18	0.73	-2.00
1973	3	*****	6.61	-0.83	1.45	*****	*****	*****	1.13	3.00
1973	4	-1.40	2.22	5.59	4.10	2.67	5.00	4.00	-1.40	0.25
1974	1	*****	3.77	0.0	0.93	*****	*****	*****	1.00	100.00
1974	2	-25.22	-22.00	-17.33	-25.30	-0.26	0.32	0.0	0.46	-0.46
1974	3	*****	4.72	-1.57	-4.72	*****	*****	*****	1.33	-2.00
1974	4	20.67	17.02	2.32	5.70	0.14	0.59	0.68	0.53	0.20

NOTE--STATISTICS SIGNIFY INCOMPLETE DATA.

Table E-7-- FORECAST EVALUATION OF CASH RECEIPTS FROM FARM MARKETING'S TOTAL (BIL DOL)
FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1971-1974

* - - - - - F O R E C A S T - - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1971	1	*****	*****	*****	11.300	11.000
1971	2	*****	*****	*****	10.500	10.400
1971	3	*****	12.600	12.700	13.500	13.200
1971	4	15.600	15.900	16.400	16.400	17.800
1972	1	*****	*****	*****	11.200	12.500
1972	2	*****	*****	10.600	10.900	11.400
1972	3	*****	13.300	13.800	14.500	14.900
1972	4	17.500	17.700	18.700	19.400	20.500
1973	1	*****	12.600	13.000	15.100	18.100
1973	2	11.400	11.700	12.800	13.400	16.600
1973	3	*****	15.700	16.400	19.600	23.100
1973	4	19.800	21.200	27.000	29.600	30.800
1974	1	*****	17.900	19.300	22.000	23.100
1974	2	15.100	15.600	18.400	17.200	17.700
1974	3	*****	22.400	22.300	23.000	22.900
1974	4	29.300	29.200	34.200	32.900	29.800
THEIL-U		1.072	0.951	0.719	0.417	

NOTE--VALUES ARE SIGNIFY INCOMPLETE DATA.

Table E-8-- FORECAST EVALUATION OF CASH RECEIPTS FROM FARM MARKETINGS TOTAL (RIL DOL)
DEFECT ERROR AND REVISION RATIO BY FORECAST PERIOD, 1971-1974

		* - - - - R E V I S I O N				R A T I O - - - - *				
YEAR	QUARTER	1ST	2ND	3RD	4TH	R1.2	R1.3	R1.4	R2.3	R3.4
1971	1	*****	*****	*****	2.73	*****	*****	*****	*****	*****
1971	2	*****	*****	0.96	0.96	*****	*****	*****	*****	0.0
1971	3	*****	-4.55	-3.79	2.27	*****	*****	*****	0.17	1.60
1971	4	-12.36	-10.67	-7.87	-7.87	0.14	0.36	0.36	0.26	0.0
1972	1	*****	*****	*****	-10.40	*****	*****	*****	*****	*****
1972	2	*****	*****	-7.02	-4.39	*****	*****	*****	*****	0.37
1972	3	*****	-10.74	-7.38	-2.68	*****	*****	*****	0.31	0.64
1972	4	-14.63	-12.66	-8.78	-5.37	0.07	0.40	0.63	0.36	0.39
1973	1	*****	-30.39	-28.18	-16.57	*****	*****	*****	0.07	0.41
1973	2	-21.33	-20.52	-22.89	-19.28	0.06	0.27	0.38	0.22	0.16
1973	3	*****	-32.03	-29.00	-15.15	*****	*****	*****	0.09	0.48
1973	4	-25.71	-31.17	-12.34	-3.90	0.13	0.65	0.89	0.60	0.68
1974	1	*****	-22.51	-16.45	-4.76	*****	*****	*****	0.27	0.71
1974	2	-14.40	-11.86	3.95	-2.82	0.19	1.27	0.81	1.33	1.71
1974	3	*****	-2.18	-2.62	0.44	*****	*****	*****	-0.20	1.17
1974	4	-1.68	-2.01	14.77	10.40	-0.20	9.80	7.20	8.33	0.30

NOTE--STATISTICS SOMETIMES INCOMPLETE DATA.

Table E-9-- FORECAST EVALUATION OF CASH RECEIPTS FROM MARKETING--LIVESTOCK&PRODUCTS(8IL DOL)
 FORECASTS, REPORTED VALUES AND THEIR-1 STATISTIC BY FORECAST PERIOD, 1971-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1971	1	*****	*****	*****	7.000	7.000
1971	2	*****	*****	7.100	7.200	7.400
1971	3	*****	7.100	7.200	7.400	7.600
1971	4	7.600	7.900	8.200	7.800	8.300
1972	1	*****	*****	*****	7.100	8.000
1972	2	*****	*****	7.500	8.000	8.300
1972	3	*****	7.900	8.400	9.000	8.800
1972	4	7.900	8.100	9.300	9.700	9.600
1973	1	*****	8.300	8.400	9.100	10.600
1973	2	8.500	8.700	9.200	9.900	11.000
1973	3	*****	9.200	9.900	12.000	12.200
1973	4	9.200	9.700	12.300	11.700	12.500
1974	1	*****	11.200	11.000	12.000	115.000
1974	2	11.100	11.100	12.200	11.200	9.900
1974	3	*****	11.500	11.100	10.600	9.900
1974	4	12.100	11.900	11.300	11.200	10.100
TOTAL--		1.023	0.994	0.005	0.985	

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table E-10-- FORECAST EVALUATION OF CASH RECEIPTS FROM FARM MARKETING-S-LIVESTOCK&PRODUCTS(BIL DOL)
 PERCENT ERROR AND DEVIATION RATIO BY FORECAST PERIOD, 1971-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	PERCENT ERROR	DEVIATION	RATIO	PERCENT ERROR	DEVIATION	RATIO
1971	1	*****	*****	*****	0.0	*****	*****	*****	*****	*****	*****
1971	2	*****	*****	-4.05	-2.70	*****	*****	*****	*****	*****	0.33
1971	3	*****	*****	-5.26	-2.63	*****	*****	*****	0.20	*****	0.50
1971	4	*****	-4.02	-1.20	-6.02	0.43	0.86	0.29	0.75	*****	-4.00
1972	1	*****	*****	*****	-11.25	*****	*****	*****	*****	*****	*****
1972	2	*****	*****	-9.64	-3.61	*****	*****	*****	*****	*****	0.62
1972	3	*****	-10.22	-4.55	2.27	*****	*****	*****	0.56	*****	1.50
1972	4	-17.71	-15.62	-3.13	1.04	0.12	0.82	1.06	0.80	*****	1.33
1973	1	*****	-21.70	-18.87	-14.15	*****	*****	*****	0.13	*****	0.25
1973	2	-22.72	-20.01	-16.36	-10.00	0.08	0.28	0.56	0.22	*****	0.39
1973	3	*****	-24.50	-19.67	-1.64	*****	*****	*****	0.20	*****	0.92
1973	4	-24.47	-22.40	-1.60	-6.40	0.15	0.94	0.76	0.93	*****	-3.00
1974	1	*****	-00.26	-90.43	-89.57	*****	*****	*****	-0.00	*****	0.01
1974	2	12.12	12.12	23.23	13.13	0.0	-0.92	-0.08	-0.92	*****	0.43
1974	3	*****	14.16	12.12	7.07	*****	*****	*****	0.25	*****	0.42
1974	4	19.00	17.02	11.88	10.89	0.10	0.40	0.45	0.33	*****	0.08

NOTE--SOME FIGURES MAY BE INCOMPLETE DATA.

Table E-11-- FORECAST EVALUATION OF CASH RECEIPTS FROM FARM MARKETING-CROPS (AIL DOL)
 FORECASTS, REPORTED VALUES AND THEIR 4-QUARTER STATISTICS BY FORECAST PERIOD, 1971-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1971	1	*****	*****	*****	4.300	4.000
1971	2	*****	*****	*****	3.300	3.000
1971	3	*****	5.500	5.500	6.100	5.600
1971	4	9.000	8.000	8.200	8.600	9.600
1972	1	*****	*****	*****	4.000	4.500
1972	2	*****	*****	3.000	2.900	3.100
1972	3	*****	5.400	5.400	5.500	6.100
1972	4	0.500	3.600	9.400	9.700	10.900
1973	1	*****	4.300	4.400	6.000	7.600
1973	2	2.900	3.000	3.600	3.500	5.600
1973	3	*****	6.500	6.600	7.600	10.900
1973	4	10.600	11.500	14.700	17.900	18.200
1974	1	*****	4.700	8.300	10.000	11.600
1974	2	4.000	4.500	6.200	6.000	7.800
1974	3	*****	10.900	11.200	12.400	13.000
1974	4	17.200	17.300	22.900	21.700	19.700

THEIR-11-2 1.133 1.030 0.783 0.498

NOTES--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table E-12-- FORECAST EVALUATION OF CASH RECEIPTS FROM MARKETING-CROPS (RIL DOL)
PERCENT ERRORS AND REVISION RATIO BY FORECAST PERIOD, 1971-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	PERCENT ERROR	R1.2	R1.3	R1.4	R2.3	R3.4
1971	1	*****	*****	*****	7.50	*****	*****	*****	*****	*****	*****
1971	2	*****	*****	13.33	10.00	*****	*****	*****	*****	*****	0.25
1971	3	*****	-1.70	-1.70	8.93	*****	*****	*****	*****	0.0	6.00
1971	4	-17.67	-16.67	-14.58	-10.42	0.0	0.12	0.38	0.12	0.29	0.29
1972	1	*****	*****	*****	-11.11	*****	*****	*****	*****	*****	*****
1972	2	*****	*****	-3.23	-6.45	*****	*****	*****	*****	*****	-1.00
1972	3	*****	-11.48	-11.48	-9.84	*****	*****	*****	*****	0.0	0.14
1972	4	-12.84	-11.93	-13.76	-11.01	0.07	-0.07	0.14	-0.15	0.20	0.20
1973	1	*****	-42.42	-42.11	-21.05	*****	*****	*****	*****	0.03	0.50
1973	2	-49.21	-46.43	-35.71	-37.50	0.04	0.26	0.22	0.23	-0.05	-0.05
1973	3	*****	-40.37	-39.45	-30.28	*****	*****	*****	0.02	0.23	0.23
1973	4	-41.76	-36.81	-19.23	-1.65	0.12	0.54	0.96	0.48	0.91	0.91
1974	1	*****	-42.24	-28.45	-13.70	*****	*****	*****	*****	0.33	0.52
1974	2	-48.72	-42.31	-20.51	-23.08	0.13	0.58	0.53	0.52	-0.12	-0.12
1974	3	*****	-16.15	-13.85	-4.62	*****	*****	*****	*****	0.14	0.67
1974	4	-12.60	-12.18	16.24	10.15	0.04	2.28	1.80	2.33	0.37	0.37

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table E-13-- FORECAST EVALUATION OF GOVERNMENT PAYMENTS (MIL.DOL.)
FORECASTS. REPORTED VALUES AND THRU-U STATISTIC BY FORECAST PERIOD. 1971-1974

* - - - - - F O R E C A S T - - - - *					
YEAR	QUARTER	1ST	2ND	3RD	4TH
					REPORTED
1971	1	*****	*****	*****	3.200
1971	2	*****	*****	3.200	3.200
1971	3	*****	3.200	3.100	3.200
1971	4	3.200	3.100	3.300	3.200
1972	1	*****	*****	*****	3.700
1972	2	*****	*****	.500	4.100
1972	3	*****	4.500	4.300	4.100
1972	4	4.500	4.500	4.500	4.000
1973	1	*****	4.500	4.000	3.000
1973	2	4.400	3.900	2.600	2.600
1973	3	*****	2.500	2.500	2.400
1973	4	2.400	2.400	2.400	2.400
1974	1	*****	2.400	0.400	0.500
1974	2	2.400	0.300	0.300	0.500
1974	3	*****	0.300	0.400	0.500
1974	4	0.300	0.400	0.900	0.500
THRU-U		0.720	0.541	0.244	0.183

NOTE--STATISTICS SHOWN INCOMPLETE DATA.

Table E-14--FORECAST EVALUATION OF GOVERNMENT PAYMENTS (MIL. DOLL.)
 SEVENTEEN YEAR REVISION RATIO BY FORECAST PERIOD, 1971-1974

		FORECAST ERROR				REVISION RATIO				
YEAR	QUARTER	1ST	2ND	3RD	4TH	R1.2	R1.3	R1.4	R2.3	R3.4
1971	1	*****	*****	*****	0.0	*****	*****	*****	*****	*****
1971	2	*****	*****	0.0	3.13	*****	*****	*****	*****	10.00
1971	3	*****	0.0	-3.12	0.0	*****	*****	*****	-10.00	1.00
1971	4	0.0	-3.12	3.13	0.0	-10.00	10.00	0.0	2.00	1.00
1972	1	*****	*****	*****	21.62	*****	*****	*****	*****	*****
1972	2	*****	*****	9.76	0.0	*****	*****	*****	*****	1.00
1972	3	*****	9.76	4.88	4.88	*****	*****	*****	0.50	0.0
1972	4	12.50	12.50	12.50	7.50	0.0	0.0	0.40	0.0	0.40
1973	1	*****	50.00	33.33	0.0	*****	*****	*****	0.33	1.00
1973	2	49.23	50.00	0.0	0.0	0.25	1.00	1.00	1.00	0.0
1973	3	*****	4.17	4.17	4.17	*****	*****	*****	0.0	0.0
1973	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1974	1	*****	20.00	-20.00	-20.00	*****	*****	*****	1.05	0.0
1974	2	30.00	-40.00	-40.00	-20.00	1.11	1.11	1.05	0.0	0.50
1974	3	*****	-40.00	-20.00	80.00	*****	*****	*****	0.50	5.00
1974	4	-40.00	-20.00	40.00	0.0	0.50	3.00	1.00	5.00	1.00

NOTE--STATISTICS STYLIFY INCOMPLETE DATA.

Table E-15--FORECAST EVALUATION OF FARM PRODUCTION EXPENSES (RIL DOL)
 FORECASTS, REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1971-1974

* - - - - - F O R E C A S T - - - - *						
YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1971	1	*****	*****	*****	41.300	42.200
1971	2	*****	*****	41.800	41.900	42.800
1971	3	*****	42.200	42.300	43.500	44.300
1971	4	42.600	42.600	43.900	43.200	44.900
1972	1	*****	*****	*****	42.800	45.600
1972	2	*****	*****	43.400	44.500	46.500
1972	3	*****	43.600	45.000	47.200	49.400
1972	4	44.300	45.700	47.400	47.800	51.500
1973	1	*****	47.800	48.300	50.500	60.100
1973	2	48.100	48.700	51.000	53.500	62.900
1973	3	*****	51.500	53.200	63.200	67.000
1973	4	51.800	52.900	67.000	75.100	69.000
1974	1	*****	68.500	70.000	78.000	72.600
1974	2	69.500	66.000	80.000	81.800	73.200
1974	3	*****	69.000	68.100	78.100	73.800
1974	4	65.800	64.900	81.700	76.900	74.000
THEIL-U-2		0.929	0.855	0.664	0.508	

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table E-16--FORECAST EVALUATION OF FARM PRODUCTION EXPENSES (MIL DOL)
 DEGREE OF ERROR AND REVISION RATIO BY FORECAST PERIOD, 1971-1974

		PERCENT ERROR				REVISION RATIO				
YEAR	QUARTER	1ST	2ND	3RD	4TH	R1.2	R1.3	R1.4	R2.3	R3.4
1971	1	*****	*****	*****	-2.13	*****	*****	*****	*****	*****
1971	2	*****	*****	-2.34	-2.10	*****	*****	*****	*****	0.10
1971	3	*****	-4.74	-4.51	-1.81	*****	*****	*****	0.05	0.60
1971	4	-5.12	-5.12	-2.23	-3.70	0.0	0.57	0.26	0.57	-0.70
1972	1	*****	*****	*****	-6.14	*****	*****	*****	*****	*****
1972	2	*****	*****	-6.67	-4.30	*****	*****	*****	*****	0.35
1972	3	*****	-11.74	-8.91	-4.45	*****	*****	*****	0.24	0.50
1972	4	-13.94	-11.26	-7.96	-7.18	0.19	0.43	0.49	0.29	0.10
1973	1	*****	-20.47	-19.63	-15.97	*****	*****	*****	0.04	0.19
1973	2	-23.53	-22.58	-18.92	-14.94	0.04	0.20	0.36	0.16	0.21
1973	3	*****	-23.13	-20.60	-5.67	*****	*****	*****	0.11	0.72
1973	4	-24.93	-23.33	-2.90	8.84	0.06	0.88	1.35	0.88	4.05
1974	1	*****	-5.65	-3.58	7.44	*****	*****	*****	0.37	3.08
1974	2	-5.05	-9.84	9.29	11.75	-0.05	2.84	3.32	1.94	-0.26
1974	3	*****	-6.50	-7.72	5.83	*****	*****	*****	-0.19	1.75
1974	4	-11.08	-12.30	10.41	3.92	-0.11	1.94	1.35	1.85	0.62

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table E-17--FORECAST EVALUATION OF REALIZED NET FARM INCOME (BIL.DOL.)
FORECASTS. REPORTED VALUES AND THEIL-U STATISTIC BY FORECAST PERIOD, 1971-1974

YEAR	QUARTER	1ST	2ND	3RD	4TH	REPORTED
1971	1	*****	*****	*****	14.600	14.600
1971	2	*****	*****	14.900	14.700	14.800
1971	3	*****	15.500	15.700	16.600	16.100
1971	4	15.800	14.000	16.900	16.500	16.900
1972	1	*****	*****	*****	16.300	18.500
1972	2	*****	*****	16.500	18.000	18.300
1972	3	*****	19.000	18.000	18.300	19.300
1972	4	19.000	17.700	17.800	19.600	21.300
1973	1	*****	17.800	19.200	20.300	26.100
1973	2	17.700	18.500	20.200	20.900	30.300
1973	3	*****	18.300	20.500	24.500	34.800
1973	4	17.900	20.400	23.800	28.000	37.700
1974	1	*****	23.700	25.000	27.000	33.200
1974	2	24.000	22.000	24.000	21.300	24.400
1974	3	*****	23.000	19.400	24.200	25.400
1974	4	22.100	18.100	25.800	25.000	27.900

THEIL-U-2 1.023 0.991 0.811 0.612

NOTE--ASTERISKS SIGNIFY INCOMPLETE DATA.

Table E-18--ESTIMATION OF REALIZED NET FARM INCOME (BIL. DOL.)
 SERIES: ERRORS AND REVISION RATIO BY FORECAST PERIOD, 1971-1974

YEAR	OBSERVED	ERROR				REVISION						
		1ST	2ND	3RD	4TH	R1.2	R1.3	R1.4	R2.3	R3.4		
1971	1	*****	*****	*****	0.0	*****	*****	*****	*****	*****	*****	*****
1971	2	*****	*****	0.0	-0.64	*****	*****	*****	*****	*****	-10.00	*****
1971	3	*****	-3.73	-2.68	3.11	*****	*****	*****	0.33	*****	2.25	*****
1971	4	-6.51	-5.33	-0.59	-2.37	0.12	0.91	0.64	0.89	*****	-3.00	*****
1972	1	*****	*****	*****	-11.89	*****	*****	*****	*****	*****	*****	*****
1972	2	*****	*****	-9.74	-1.64	*****	*****	*****	*****	*****	0.83	*****
1972	3	*****	-6.74	-6.74	-5.18	*****	*****	*****	0.0	*****	0.23	*****
1972	4	-10.00	-16.30	-15.43	-7.94	-0.57	-0.52	0.26	0.03	*****	0.51	*****
1973	1	*****	-31.20	-25.44	-22.22	*****	*****	*****	0.17	*****	0.16	*****
1973	2	-41.52	-30.04	-33.33	-31.02	0.06	0.20	0.25	0.14	*****	0.07	*****
1973	3	*****	-47.41	-41.00	-29.60	*****	*****	*****	0.13	*****	0.28	*****
1973	4	-52.22	-45.09	-36.87	-25.73	0.13	0.30	0.51	0.20	*****	0.30	*****
1974	1	*****	-28.41	-24.70	-18.67	*****	*****	*****	0.14	*****	0.24	*****
1974	2	-1.54	-0.04	-1.54	-12.70	-5.00	0.0	-6.75	0.83	*****	-6.75	*****
1974	3	*****	-0.45	-23.62	-4.72	*****	*****	*****	-1.50	*****	0.80	*****
1974	4	-20.72	-25.13	-7.23	-10.30	-0.49	0.64	0.50	0.79	*****	-0.38	*****

NOTE--STATISTICS SOMETIMES INCOMPLETE DATA.

Table E-19-- FORECAST EVALUATION: DISTRIBUTION OF REVISION RATIOS FOR FARM INCOME MEASURES

FORECAST REVISION AND VARIABLE	PERCENTAGE OF R STATISTICS				
	.01- 1.99	.01- 1.99	1.00- 1.99	OVER 1.99	UNDER 0.00
R1.2					
VOLUME OF ALL FARM MARKETINGS (1967=100)	66.67	66.67	0.0	16.67	16.67
VOLUME OF FARM MARKETINGS - LIVESTOCK&LIVESTOCK PRODUCTS(1967=100)	50.00	50.00	0.0	0.0	16.67
VOLUME OF FARM MARKETINGS -CROPS (1967=100)	16.67	16.67	0.0	33.33	16.67
CASH RECEIPTS FROM FARM MARKETINGS TOTAL (BIL DOL)	83.33	83.33	0.0	0.0	16.67
CASH RECEIPTS FROM FARM MARKETINGS-LIVESTOCK&PRODUCTS(BIL DOL)	83.33	83.33	0.0	0.0	16.67
CASH RECEIPTS FROM FARM MARKETINGS-CROPS (BIL DOL)	83.33	83.33	0.0	0.0	16.67
GOVERNMENT PAYMENTS (BIL DOL.)	83.33	83.33	0.0	0.0	16.67
FARM PRODUCTION EXPENSES (BIL DOL)	50.00	33.33	16.67	0.0	16.67
REALIZED NET FARM INCOME (BIL DOL.)	50.00	50.00	0.0	0.0	33.33
* * * FORECAST TOTAL * * *	59.26	57.41	1.85	5.56	18.52
R1.3					
VOLUME OF ALL FARM MARKETINGS (1967=100)	66.67	33.33	33.33	16.67	16.67
VOLUME OF FARM MARKETINGS - LIVESTOCK&LIVESTOCK PRODUCTS(1967=100)	66.67	33.33	33.33	0.0	33.33
VOLUME OF FARM MARKETINGS -CROPS (1967=100)	66.67	66.67	0.0	16.67	16.67
CASH RECEIPTS FROM FARM MARKETINGS TOTAL (BIL DOL)	83.33	66.67	16.67	16.67	0.0
CASH RECEIPTS FROM FARM MARKETINGS-LIVESTOCK&PRODUCTS(BIL DOL)	83.33	83.33	0.0	0.0	16.67
CASH RECEIPTS FROM FARM MARKETINGS-CROPS (BIL DOL)	66.67	66.67	0.0	16.67	16.67
GOVERNMENT PAYMENTS (BIL DOL.)	33.33	0.0	33.33	33.33	0.0
FARM PRODUCTION EXPENSES (BIL DOL)	83.33	66.67	16.67	16.67	0.0
REALIZED NET FARM INCOME (BIL DOL.)	66.67	66.67	0.0	0.0	16.67
* * * FORECAST TOTAL * * *	68.52	53.70	14.81	12.96	12.96
R1.4					
VOLUME OF ALL FARM MARKETINGS (1967=100)	66.67	50.00	16.67	16.67	16.67
VOLUME OF FARM MARKETINGS - LIVESTOCK&LIVESTOCK PRODUCTS(1967=100)	33.33	33.33	0.0	33.33	33.33
VOLUME OF FARM MARKETINGS -CROPS (1967=100)	50.00	50.00	0.0	16.67	16.67
CASH RECEIPTS FROM FARM MARKETINGS TOTAL (BIL DOL)	83.33	83.33	0.0	16.67	0.0
CASH RECEIPTS FROM FARM MARKETINGS-LIVESTOCK&PRODUCTS(BIL DOL)	83.33	66.67	16.67	0.0	16.67
CASH RECEIPTS FROM FARM MARKETINGS-CROPS (BIL DOL)	100.00	83.33	16.67	0.0	0.0
GOVERNMENT PAYMENTS (BIL DOL.)	66.67	16.67	50.00	0.0	0.0
FARM PRODUCTION EXPENSES (BIL DOL)	83.33	50.00	33.33	16.67	0.0
REALIZED NET FARM INCOME (BIL DOL.)	83.33	83.33	0.0	0.0	16.67
* * * FORECAST TOTAL * * *	72.22	57.41	14.81	11.11	11.11
R2.3					
VOLUME OF ALL FARM MARKETINGS (1967=100)	75.00	41.67	33.33	0.0	16.67
VOLUME OF FARM MARKETINGS - LIVESTOCK&LIVESTOCK PRODUCTS(1967=100)	50.00	25.00	25.00	8.33	25.00
VOLUME OF FARM MARKETINGS -CROPS (1967=100)	75.00	41.67	33.33	0.0	16.67
CASH RECEIPTS FROM FARM MARKETINGS TOTAL (BIL DOL)	83.33	75.00	8.33	8.33	8.33
CASH RECEIPTS FROM FARM MARKETINGS-LIVESTOCK&PRODUCTS(BIL DOL)	83.33	83.33	0.0	0.0	16.67
CASH RECEIPTS FROM FARM MARKETINGS-CROPS (BIL DOL)	66.67	66.67	0.0	8.33	8.33
GOVERNMENT PAYMENTS (BIL DOL.)	41.67	25.00	16.67	16.67	8.33
FARM PRODUCTION EXPENSES (BIL DOL)	91.67	75.00	16.67	0.0	8.33
REALIZED NET FARM INCOME (BIL DOL.)	83.33	83.33	0.0	0.0	8.33
* * * FORECAST TOTAL * * *	72.22	57.41	14.81	4.63	12.96
R3.4					
VOLUME OF ALL FARM MARKETINGS (1967=100)	57.14	42.86	14.29	21.43	14.29
VOLUME OF FARM MARKETINGS - LIVESTOCK&LIVESTOCK PRODUCTS(1967=100)	28.57	21.43	7.14	0.0	57.14
VOLUME OF FARM MARKETINGS -CROPS (1967=100)	42.86	35.71	7.14	14.29	35.71
CASH RECEIPTS FROM FARM MARKETINGS TOTAL (BIL DOL)	85.71	64.29	21.43	0.0	0.0
CASH RECEIPTS FROM FARM MARKETINGS-LIVESTOCK&PRODUCTS(BIL DOL)	85.71	71.43	14.29	0.0	14.29
CASH RECEIPTS FROM FARM MARKETINGS-CROPS (BIL DOL)	71.43	71.43	0.0	7.14	21.43
GOVERNMENT PAYMENTS (BIL DOL.)	50.00	14.29	35.71	14.29	0.0
FARM PRODUCTION EXPENSES (BIL DOL)	71.43	64.29	7.14	14.29	14.29
REALIZED NET FARM INCOME (BIL DOL.)	64.29	64.29	0.0	7.14	28.57
* * * FORECAST TOTAL * * *	61.90	50.00	11.90	8.73	20.63

Table E-20--FORECAST EVALUATION: SUMMARY OF PERCENT ERROR AND THEIL-U STATISTIC FOR THE PERIOD FARM INCOME MEASURES

PERCENT ERROR								THEIL-U	
AVERAGE	RANGE		UNDER-EST.	OVER-EST.	U1	U2			
	LOW	HIGH							
FORECAST PERIOD 1									
VOL WE OF ALL FARM MARKETING (1967=100)	7.07	1.27	14.60	83.33	16.67	1.317	0.978		
VOL WE OF FARM MARKETING - LIVESTOCK&LIVESTOCK PRODUCTS (1967=100)	2.94	0.96	4.02	33.33	66.67	1.921	1.357		
VOL WE OF FARM MARKETING - CROPS (1967=100)	13.13	0.25	25.33	83.33	16.67	1.278	1.060		
CASH RECEIPTS FROM FARM MARKETING TOTAL (BIL DOL)	18.40	1.68	35.71	100.00	0.0	1.254	1.072		
CASH RECEIPTS FROM FARM MARKETING-LIVESTOCK&PRODUCTS (BIL DOL)	17.87	8.43	26.40	66.67	33.33	1.630	1.023		
CASH RECEIPTS FROM FARM MARKETING-CROPS (BIL DOL)	30.15	12.69	48.72	100.00	0.0	1.029	1.133		
GOVERNMENT PAYMENTS (BIL DOL)	63.62	0.0	380.00	16.67	50.00	0.221	0.728		
FARM PRODUCTION EXPENSES (BIL DOL)	13.95	5.05	24.93	100.00	0.0	0.826	0.929		
REALIZED NET FARM INCOME (BIL DOL)	22.31	1.64	52.52	100.00	0.0	1.248	1.023		
FORECAST PERIOD 2									
VOL WE OF ALL FARM MARKETING (1967=100)	6.53	0.67	13.98	50.00	50.00	1.445	1.085		
VOL WE OF FARM MARKETING - LIVESTOCK&LIVESTOCK PRODUCTS (1967=100)	3.43	0.96	10.00	33.33	66.67	1.746	1.333		
VOL WE OF FARM MARKETING - CROPS (1967=100)	11.59	0.44	32.00	41.67	58.33	1.407	1.051		
CASH RECEIPTS FROM FARM MARKETING TOTAL (BIL DOL)	16.77	2.01	32.03	100.00	0.0	1.018	0.951		
CASH RECEIPTS FROM FARM MARKETING-LIVESTOCK&PRODUCTS (BIL DOL)	21.93	4.82	90.26	75.00	25.00	0.974	0.994		
CASH RECEIPTS FROM FARM MARKETING-CROPS (BIL DOL)	26.81	1.79	46.43	100.00	0.0	0.814	1.030		
GOVERNMENT PAYMENTS (BIL DOL)	50.80	0.0	380.00	33.33	50.00	0.369	0.541		
FARM PRODUCTION EXPENSES (BIL DOL)	13.05	4.74	23.33	100.00	0.0	0.705	0.855		
REALIZED NET FARM INCOME (BIL DOL)	23.31	3.73	47.41	100.00	0.0	0.977	0.991		
FORECAST PERIOD 3									
VOL WE OF ALL FARM MARKETING (1967=100)	4.59	0.0	10.91	42.86	42.86	0.996	0.849		
VOL WE OF FARM MARKETING - LIVESTOCK&LIVESTOCK PRODUCTS (1967=100)	2.87	0.0	10.00	35.71	57.14	1.853	1.312		
VOL WE OF FARM MARKETING - CROPS (1967=100)	7.27	0.0	25.42	64.29	28.57	0.996	0.754		
CASH RECEIPTS FROM FARM MARKETING TOTAL (BIL DOL)	11.86	0.96	29.00	78.57	21.43	0.849	0.719		
CASH RECEIPTS FROM FARM MARKETING-LIVESTOCK&PRODUCTS (BIL DOL)	15.86	1.20	90.43	78.57	21.43	0.977	0.995		
CASH RECEIPTS FROM FARM MARKETING-CROPS (BIL DOL)	19.55	1.79	42.11	85.71	14.29	0.804	0.783		
GOVERNMENT PAYMENTS (BIL DOL)	16.49	0.0	80.00	28.57	50.00	0.286	0.244		
FARM PRODUCTION EXPENSES (BIL DOL)	8.98	2.23	20.60	85.71	14.29	0.776	0.664		
REALIZED NET FARM INCOME (BIL DOL)	16.52	0.0	41.09	92.86	0.0	0.831	0.811		
FORECAST PERIOD 4									
VOL WE OF ALL FARM MARKETING (1967=100)	4.00	0.0	11.83	37.50	56.25	0.817	0.738		
VOL WE OF FARM MARKETING - LIVESTOCK&LIVESTOCK PRODUCTS (1967=100)	2.83	0.49	7.34	37.50	62.50	2.034	1.428		
VOL WE OF FARM MARKETING - CROPS (1967=100)	7.49	0.88	25.33	62.50	37.50	0.664	0.632		
CASH RECEIPTS FROM FARM MARKETING TOTAL (BIL DOL)	6.87	0.44	19.28	68.75	31.25	0.491	0.417		
CASH RECEIPTS FROM FARM MARKETING-LIVESTOCK&PRODUCTS (BIL DOL)	11.40	0.0	89.57	62.50	31.25	0.971	0.985		
CASH RECEIPTS FROM FARM MARKETING-CROPS (BIL DOL)	13.59	1.65	37.50	75.00	25.00	0.477	0.498		
GOVERNMENT PAYMENTS (BIL DOL)	10.08	0.0	80.00	12.50	37.50	0.239	0.183		
FARM PRODUCTION EXPENSES (BIL DOL)	6.44	1.81	15.97	68.75	31.25	0.740	0.508		
REALIZED NET FARM INCOME (BIL DOL)	11.74	0.0	31.02	87.50	6.25	0.639	0.612		

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